ILLUSTRATED
ELECTRICAL REVIEW
A Journal of Scientific and Electrical Progress.

VOL. 25. No. 6. WEEKLY.

NEW YORK, WEDNESDAY, AUGUST 8, 1894.

$3 per Annum. Single Copies, 10 Cents.

Copyright, 1894, by ELECTRICAL REVIEW PUBLISHING COMPANY, 13 Park Row, New York.

Entered at Post Office, New York, as Mail Matter of the Second Class.

VIEWS, NEWS AND INTERVIEWS.

The elevated roads of New York should look up the question of the adoption of electric power at once. Their system is behind the times.

Mr. Henry W. Darling, recently elected to the treasurership of the General Electric Company, was formerly a prominent dry goods merchant of Toronto, Can., and was president of the Canadian Bank of Commerce, with a capital of $7,000,000; also five years president of the Toronto Board of Trade, which body under his administration became the leading commercial organization of the Dominion. Mr. Darling's business capacity has had a thorough test in the experiences of the General Electric Company for the past two years, and his selection for the position of treasurer confirms the impression he made upon Toronto as a man of extraordinary business ability.

Several years ago Prof. John P. Barrett, of Chicago, undertook to bury the wires. This is the way he came to think of the plan:

"We had a district in Chicago," said he, "that called for fire protection. We couldn't reach it with fire alarm wires without passing through the most stylish residence section of the city, and there was a howl at the idea of stringing wires along those streets. To prevent any injunction proceedings we got out one Sunday morning while the people were at church and rushed up the poles. The next morning the section was up in arms. I said that the only way out of the difficulty was to put the wires underground.

"'How much will it cost?' the spokesman asked.

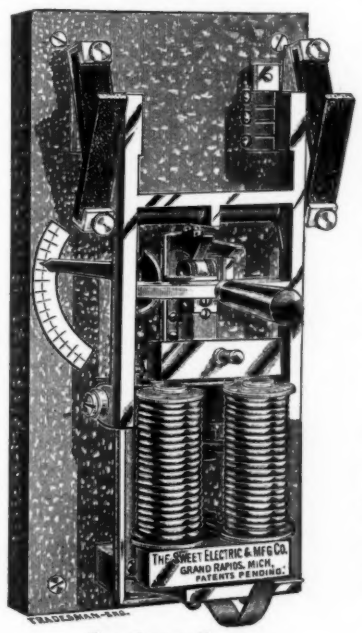
"I said, 'About $1,300.'

"The next morning the coin was placed on my desk. I put the wires underground, and every electrician laughed at what they called my foolish prank.

"'Wait until the first good thunderstorm comes along,' said they, 'and there won't be enough of Barrett's wire left to dig out of the ground.'"

"But you knew different, didn't you, Mr. Barrett?" was asked.

"No, I didn't. They had me so badly scared, to tell the truth about it, that I waited for the first thunderstorm with a great deal of anxiety. I kept two men waiting with a reel of wire to supplant the one which



THE SWEET SWITCH.

would be burned out with the first lightning that struck it. But that wire remained, and is doing just as good service to-day as it did the day it was put down. Since then all the fire, police and telegraph wires, as well as the electric light wires, have been removed from the streets of Chicago and other cities. You won't find a wire in Chicago to-day, except an occasional house wire, which is necessary in telephone communication."

The ELECTRICAL REVIEW has received "Good Resolutions" an "engrossing" history, sent out by Ames & Rollinson, art engrossers and designers, of New York. The neat little pamphlet contains reproductions of many of the artistic designs of this firm and is very attractively gotten up.

The ELECTRICAL REVIEW, had you noticed? publishes the electrical news.

The Sweet Limit Switch.

This switch is designed to take the place of the fuse wire, and is built on correct electrical and mechanical principles. It is as positive as an ampere meter. As the ampere meter indicates the volume of current at point of distribution, so the limit switch, if set to the number of amperes required, will open the circuit of distribution on the predetermined current. The adjustment of the machine is controlled inversely as the square of the distance of the armatures on the machine to that of the field piece, so that mechanically the pull or work the machine has to do to open a circuit is practically constant whether on one or 500 amperes; any further than one ampere has less distance to pull the load than 500 amperes.

They are made for use in all pressures, from one-quarter of one volt to 10,000 volts if required. The sensitiveness of the machine is in its mechanical and electrical construction. It is stated by the manufacturers that it is so delicate in its adjustment that in the larger sizes, 200 to 700 amperes capacity, the device will open on less than one-quarter of one ampere over and above its net capacity and in the smaller sizes, one-half to 200 amperes, on less than one-twentieth of one ampere. This machine is adapted to all electrical currents, stationary and isolated plants, stationary motors, dynamos, and for house wiring; also have pattern especially for street car motors. The Sweet Electric and Manufacturing Company, of Grand Rapids, Mich., have started the manufacture and sale of this switch, and have already met with flattering success in placing it on the market.

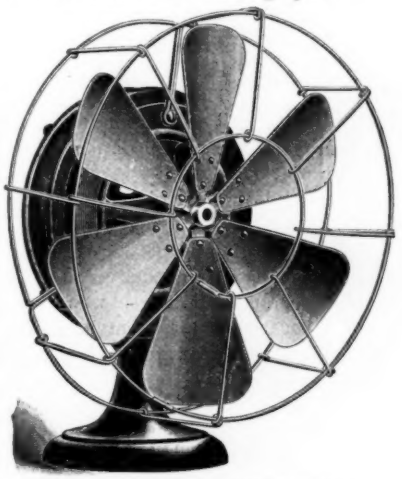
Siemens & Halske Works Burned.

The factory of the Siemens & Halske Electric Company of America, manufacturers of dynamos, motors, and electric machines of all kinds, 1166 to 1182 South Wood street, Chicago, was completely destroyed by fire on Wednesday last. The loss is estimated at $800,000, and is said to be well covered with insurance. The works are to be rebuilt with as little delay as possible.

The General Electric Fan Motor.

The extreme Summer heat which is upon the country has turned the mind of every man fortunate enough to live or have his office in a building where electricity has been installed, to the pleasant artificial breezes created by the fan motor. In those buildings furnished with direct current the installation of a fan motor is not difficult, but in those lighted from alternating current, the unhappy occupants have had to swelter as no efficient alternating fan motors have been procurable in quantities to supply the demand.

The General Electric Company has just perfected one, which should come to these unfortunate nights as a blessed boon. It is small and compact, and is constructed for any alternating current circuit of 52 or 104 volts. The armature or moving part is



NEW FAN MOTOR FOR ALTERNATING CURRENTS.

nothing more than a solid metal wheel hung on one bearing. It has no wires at all, no brushes, no commutators, no collecting rings, in fact, no contact parts at all to cause trouble. The current from the transformer enters only a number of stationary field spools which cannot burn out, and which are entirely enclosed and protected. The fan is 10 inches in diameter, has six blades and is protected by a polished brass guard. It starts as soon as the current is thrown on and runs at 1,800 revolutions,

giving quite a powerful and cooling breeze. The height of the motor and fan over all is only 12 inches.

The principal claim for this fan motor is that it is impossible for it to get out of order. It is finished in black japan on a broad stable base.

The Association of Edison Illuminating Companies.

To the Editor of Electrical Review:

As previously announced by the secretary, the next convention of the Association of Edison Illuminating Companies will be held at Boston, Mass., commencing on Tuesday, August 14, 1894, and will continue during Wednesday, and probably Thursday of that week.

Reports of committees chosen at the meetings of last year will be made, and the following papers of practical importance submitted:

"Incandescent Lamps," Mr. A. D. Page; "The Relative Advantages of Direct and Alternating Currents for Distribution of Light and Power," Mr. W. S. R. Emmet; "A Board of Control," Prof. Wm. D. Marks; "An Edison Station in a Small City—Its Past, Present and Future," Mr. M. A. Beal; "Switchboard of the Edison Company, of New York," Mr. J. Van Vleck; "Storage Batteries," Mr. R. R. Bowker; "Boiler Tests in Atlantic Avenue Station of the Edison Electric Illuminating Company, of Boston," R. S. Hale; "Interesting Features of the Third District Station of the Edison Electric Illuminating Company, of Boston," A. G. Pierce; "Low Tension Arc Street Lighting System," Mr. W. S. Barstow.

The headquarters of the association at Boston will be at the Vendome, one of the largest hotels in this country, where the following arrangements have been made on the American plan: Board and outside room, without bath, $4 per day; board and inside room, with bath, $4 per day.

Members are requested to communicate directly with Mr. C. L. Edgar, Boston, Mass., in regard to arrangement of rooms desired, stating also whether there are any ladies in the party. The meetings of the association will be held in the hotel, where ample accommodations have been provided.

The Edison Electric Illuminating Company, of Boston, Mr. C. L. Edgar, vice-president and general manager, has arranged a very attractive programme for the entertainment of delegates in the form of drives through the beautiful suburbs of Boston, probably the finest in the world. Visits will also be made to the West End station of the Boston street railway system, and to the various Edison stations in Boston, where can be seen the latest type of central station equipments, including the recently installed central station storage battery, now in successful every day operation.

The General Electric Company will have present one or more of their officers and engineers, with a view of having them become personally acquainted with the different members of the association and of discussing matters of general interest.

The General Electric Company have extended an invitation to the members of the association to visit the Lynn works and join them in a dinner at Marblehead Neck, the great rendezvous for all yacht club races.

During the convention sessions a special entertainment will be provided for ladies accompanying members.

The Edison Electric Illuminating Company, of Boston, have provided entertainment for all members who may find it possible to reach Boston on Monday evening.

It is thought advisable, after considering the experience of previous conventions, to devote the first two days strictly to the business of the association, with as short recesses as possible, leaving the third day entirely free for pleasure trips. All members are urged to be present promptly at the opening session.

The programme for the convention will be as follows:

Tuesday, August 14—First session, 10 A. M. sharp. Reports of committees. Addresses. Second session, 2 P. M. Papers and discussions. Addresses.

Wednesday, August 15 — Early morning, 8 A. M. Drive through the suburbs of Boston. Third session, 11 A. M. Papers and discussions. Election of officers.

Thursday, August 16—Visit to the West End power station and the stations of the Edison Electric Illuminating Company, of Boston. Trip to Lynn and entertainment at Marblehead.

Delegates can also avail themselves of a pleasant evening and a delightful sail down the sound on the palace steamers of the Fall River line. These steamers start from foot of Murray street on the North River, New York, at 5.30 and 6.30 P. M.

The secretary will be pleased to engage state rooms on boat, or berth on sleeper, upon due notice being given, but parties taking the Fall River line are urged to notify the secretary as soon as possible on account of the large demand for state rooms during the Summer months.

Members are especially requested to prepare themselves by bringing with them papers and facts regarding their own business, as such may aid in discussion of the various topics which will be brought up by the members of the association.

W. S. Barstow,
Secretary.
358 Pearl street, Brooklyn, N. Y.

The Waddell-Entz Company.

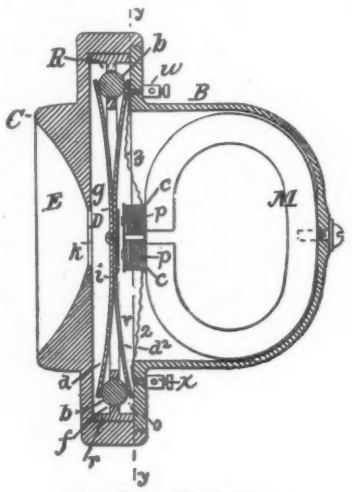
Clients and friends of the Waddell-Entz apparatus will be glad to learn that arrangements have been perfected by which the manufacture of the Waddell-Entz dynamos and motors will be carried on with improved manufacturing facilities and on a more extensive scale than formerly.

The machines will be built in Bridgeport, Conn., in a new shop fully equipped with the most improved tools and machinery, overhead traveling crane, etc., and the most ample facilities for turning out the highest class of mechanical work with promptness and dispatch.

Mr. Waddell still retains his connection with the enterprise, and the sales department will be in charge of Mr. J. A. Machado, of 203 Broadway, New York, who has been connected with the Waddell-Entz Company since its organization, and who has a host of friends in the electrical field.

A Ball-Bearing Telephone.

A rather novel idea is developed in a late patent issued to the American Bell Telephone Company as assignor of Stephen D. Field. The idea of improving racing buggies and all sorts of rotating machinery by adding ball-bearings has become familiar, but it has been left for Mr. Field to bring them into service in a telephone. The construction employed will be readily understood upon inspection of the accompanying engraving. The diaphragm is duplex, consisting of two ferrotype plates riveted together at the centers and sprung apart at the peripheries, a series of hard



The Field Telephone.

spherical balls being interposed between the rims. The result of the construction is that an iron mass of double the carrying capacity for lines of force is provided without materially interfering with freedom of vibration; this adds, it is claimed, to a magneto-telephone two very important functions: an improvement in articulation and increased induction power. The weakness of magneto-telephones is largely due to the small carrying capacity of the diaphragm for lines of force; in proportion as this is increased, these things being equal, the inductive power, and, consequently, the talking power, is increased. Another feature of advantage in the construction doubtless follows from the freedom of the diaphragm to vibrate at the edge without flopping about. Telephone diaphragms rigidly confined at the rim are poor talkers. It is desirable to have the rim free.

Electricity vs. Cable in Transmission.

In a recent discussion on electric railroading L. B. Stillwell, in a few simple figures, embodied a most instructive comparison of the relative efficiency of electricity and the cable for power transmission. A steel cable one and one-half inches in diameter, traveling 12 miles an hour, can transmit nearly 2,000 horse-power. A copper wire with a section of one square inch will carry an electric current of 10,000 volts, at 1,000 amperes to the square inch, and such a current is now being transmitted in this country. This is eqaul to 13,000 horse-power, which is enough to instantly rupture six cables such as are ordinarily used in cable traffic.

Large Electric Railway Work in Chicago.

The tendency for very large electric direct coupled generators, especially for railway power plants, has been illustrated again in a contract just closed between the West Chicago Street Railway Company and the Siemens & Halske Electric Company of America, for three 2,000 horse-power and one 1,000 horse-power generators. The station is to be located on the property of the company on Washington boulevard and Western avenue. The company's repair shops and stables are located there, and it is considered that the situation is particularly convenient for an electric power station, because of the central location in the territory which is to be served. The station is intended to ultimately accommodate five 2,000 horse-power generators and one 1,000 horse-power. This station, with its total capacity of 11,000 horse-power, will be the second largest in the country, and it will be capable of moving 500 cars.

About three miles of street will be converted into electric line, the cars being taken at Halsted street and connected with cable. The motor cars will be hitched onto the cable, so there will be no delay in making connections. Mr. Chapman has devised a scheme for disconnecting the electric machinery in the motor car while the train is being drawn by the cable. The bids for the electric machinery called for the completion of the first dynamo within four months of the award of the contract. The contract call for the completion of an additional machine every 15 days. The West Side power system is ultimately intended to operate electric lines on 60 miles of street, and the West Side company contemplates converting 120 miles horse car lines into electric lines.

The contracts for the construction of the North Side power house and for the engines and machinery were let Monday. The power house will be located on the river, opposite Sharpshooters' Park, at California avenue and Roscoe boulevard. The station will ultimately take in generators aggregating 6,000 horse-power. At present it is only the intention to operate 135 cars from that station, and the contracts which called for generators aggregating 2,800 horse-power. Contracts for the engines were let to the Fraser-Chalmers Company and for the electrical machinery to the Siemens & Halske Electric Company of America. The generators at the North Side station are intended to operate both North and West Side lines. The territory which will be covered will embrace all the lines of the North Chicago Street Railroad Company and will also furnish power for all the West Side lines north of North avenue. Power will also be furnished for a new line which is to be constructed on Elston avenue from Chicago avenue northwest. This Elston avenue line is being built by the Chicago Electric Transit Company, a corporation that obtained an ordinance some two years ago. The

entire electrical plants of the two street railroad companies embrace double tracks on 100 miles of street. It is expected that the first electric cars will be in operation early next year, and others will be rapidly equipped after that. The cross-town lines can be got ready to operate by electricity rapidly, for they will not have to be rebuilt. All lines laid within the last year or two were put down with the intention of changing them from horse to electric, and nothing will be necessary but to string the trolley wires. The Siemens & Halske Electric Company of America, who for the last two years have been most prominent advocates of large direct coupled units, both for lighting and power service, are to be congratulated on their success with these companies.

Receivership for the Ries Company.

The Ries Electric Specialty Company, of Baltimore, Md., has made application for the appointment of a receiver to take charge of and close up the business of that company. Mr. Elias E. Ries, the president of the company, stated that the corporation is unable to successfully prosecute its business, owing chiefly to internal dissensions among some of its stockholders, and that the assets of the company are in danger of being wasted to the prejudice of the creditors. Hence the petition for a receiver, who has been appointed with the consent of all parties for the purpose of dissolving the corporation and making an equitable distribution of the assets among the creditors and shareholders. The company was incorporated June 16, 1890, and has been engaged in the manufacture and sale of several well-known specialties, including the Ries regulating sockets for incandescent lamps. The company owns a number of valuable patents and a well equipped manufacturing plant, occupying the entire building at No. 7 South Gay street. It is the intention of Mr. Ries to reorganize the company under more favorable auspices and to take up, in addition to the inventions now controlled by it, the manufacture of some additional specialties for which there is a large demand.

The receivers named by Judge Ritchie are Bernard Weisenfeld and Sylvan H. Lauchheimer, who have filed a bond of $15,000.

Who Manufactures Electrical Carriages?

To the Editor of Electrical Review:

I wish to purchase an electrical carriage and am desirous of obtaining all the information possible. If you will send me the names of all parties or firms manufacturing such vehicles or call the attention of some of them whom you might know, you will confer a very great favor. It is so far that time is precious is why I would ask you to favor me in this matter. Possibly you have some illustrations in some of your back numbers you would send me.

Yours truly,
Jas. L. Grose,
946 Cottage Place,
Los Angeles, Cal.

July 21, 1894.

SOME EXPERIMENTS IN ELECTRIC PHOTOGRAPHY.

BY FERNANDO SANFORD IN THE "PHYSICAL REVIEW."

During the past three years I have been occasionally engaged in some experiments upon electric photography which may be of interest to the readers of the *Review*, notwithstanding the fact that Professor F. J. Smith, in his recent announcement of his "Inductoscript," has published similar results to those which I have obtained.

In 1891 I developed a negative

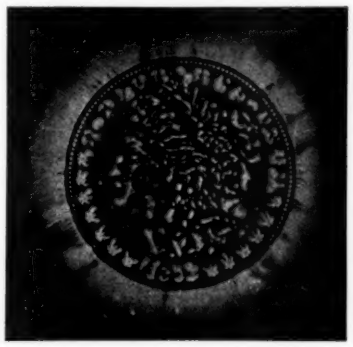


Fig. 1.

image upon a piece of bromide paper which had been placed between, and in contact with, two pieces of metal which were connected with the poles of two chromic acid cells. These negatives showed only the places of contact of the sensitized side of the paper and the one piece of metal. During the same year, I developed characters written upon a sensitized plate with the end of a wire, the other end of which was connected to one terminal of an induction coil. In September, 1892, I read the article upon "Breath Figures," by Mr. W. B. Crofts, in the *Philosophical Magazine* of August, 1892, and it occurred to me at once that these figures might be developed upon a photographic plate. I at once tried the experiment of laying the coin upon the sensitized side of the plate, and connecting it with the terminal of a small induction coil, capable of giving a spark of three or four millimetres, while a piece of tinfoil upon the opposite side of the plate was connected with the other terminal of the coil. From the very short notice which I have read of Professor Smith's Inductoscript, this is exactly the method which he is now using, except that he uses a higher potential and exposes the plate only a second, while I exposed the negatives which I made from half an hour to an hour.

Several negatives were made in this way, the accompanying photograph, No. 1, being from one of them. With one exception, they all show a fringe around them, due to the escape of the charge from the edge of the coin, which accounts for the formation of the dark ring observed around the breath figures made upon glass.

Last September I undertook to photograph in the same way objects insulated from the photographic plate, and have since made negatives of coins separated from the plate by paraffine, shellac, mica and gutta percha. The accompanying photograph, No. 2, was made on October 7, the coin being insulated from the photographic plate by a sheet of mica about 0.04 millimetre thick. The mica was laid directly upon the film side of the plate, and the coin was placed upon it and connected to one terminal of the small induction coil already mentioned. A circular piece of tinfoil of the circumference of the coin was placed upon the glass side of the plate directly opposite the coin, and was connected to the other terminal of the induction coil. The little condenser thus made was clamped between two boards and was covered up in a dark room. Two small discharging knobs were also attached to the terminals of the induction coil, and were separated by a space of less than a millimeter, so that when a single cell was connected with the primary coil, the spark between the knobs seemed continuous.

The plate was exposed to the action of the waves set up in this condenser for one hour, when it was taken out and the negative image developed upon it by the usual process. This photograph was made before I had heard of Professor Smith's process.

Several interesting facts are shown by these photographs, and it has seemed to me that the process might furnish a valuable method of studying some of the phenomena of condensers. The fact that the electric waves sent off by the condenser plates are propagated in a direction perpendicular to the plane of emergence is plainly shown by some of the negatives in my possession. The tendency for the charge to escape from the surfaces of greatest curvature is plainly shown, as in photograph No. 1. The surface of a coin which had been stamped with fine parallel lines gave no image upon the plate, on account of the dispersion of the waves from its surface. In the case of a medal

Fig. 2.

with a head of Washington in high relief, the whole head was left blank, but was outlined by a fringe like that around the edge of photograph No. 1.

I did not succeed in making a good negative through a thickness of insulator as great as one millimetre, but blackened spots of the size of the coin were made through several millimetres of gutta percha, even with the low potential mentioned above. Unquestionably, with a greater sparking distance, the effect could be observed throughout a condenser of much greater thickness.

Stanford University, Cal.,
January 6, 1893.

DOES ADVERTISING PAY?

THE SELF-WINDING CLOCK COMPANY OF 26 BROADWAY, NEW YORK, SAYS IT DOES IN THE "ELECTRICAL REVIEW."

To the Editor of Electrical Review:

Replying to Mr. Chas. W. Price's letter of the 25th, we thank you for the interest you take in our work, and beg to inform you that among the more recent contracts that we have for supplying our clocks are the Carnegie building, in which we are placing over 200 of our self-winding clocks, and the St. Louis Terminal, in which there are some 40 now being installed. All of the above clocks are connected electrically and synchronized over the Western Union Telegraph Company's wires directly from Washington. Among the more recent contracts for our programme clock for use in schools, etc., are the new High School at Marshalltown, Ia., and the new High School at Oneonta, N. Y.

We shall be glad to give you any news of our work from time to time, and it may be satisfactory to you to know that we have already had several inquiries as the result of our advertisement in your paper, and one of the jobs above referred to was secured, we believe, directly through the advertisement placed in your paper.

Yours very truly,
Self-Winding Clock Co.,
(Signed) J. K. Clarke,
Mgr. Sales Dept.

New York, July 26, 1894.

That Detroit Lighting Plant.

The Council Public Lighting Committee did not report upon the Public Lighting Commission contracts, as was expected, at the last session of the Council, says the Detroit *Tribune*. Chairman Patterson of the committee says that the committee was not ready; that it wanted to think over some matters in relation to the contracts before reporting. He gave the impression that all of the contracts except the dynamo contract would be confirmed. He holds that the Council has instructed the commission to readvertise for dynamos, and that the committee is not required to act upon the dynamo contract. The Council instructed the commission to readvertise some time before the matter was brought into courts, he says.

It is believed that the decided and systematic effort of Manager Fitzgerald and President Crane, of the Detroit Electric Light and Power Company, and C. S. Knight, of the Fort Wayne Electric Company, to induce the committee to recommend that the lighting commission be instructed to readvertise the lamp dynamo and tower contracts means that the old electric lighting matter is to become a bone of contention in the Council again.

THE GERMAN PATENT SYSTEM.

INTERESTING REPORT TO THE COMMISSIONER OF PATENTS BY EXAMINER BISSING, OF THE UNITED STATES PATENT OFFICE —THE GERMAN SYSTEM COMPARED WITH OUR OWN.

BY GUSTAV BISSING.

To the Commissioner of Patents:

SIR: I have the honor to submit the following report of my visit to the Patent Offices of Germany and Switzerland during the Summer of A. D. 1893:

The German Patent Office is situated at Berlin and occupies a large and commodious building especially erected for it, giving it ample room to transact all of its business and to keep all of its material without crowding. The first thing which strikes one upon entering is the great amount of formality which is customary in European countries. There is a porter at the main entrance to whom it is not unusual to state your business, and after having passed this functionary you have still to give your card to the wardens of the several floors and have it presented and approved before you are fortunate enough to secure an interview with a principal examiner of the Patent Office. Of course the innate courtesy of the German people smooths down as much as possible these peculiarities of custom where a foreigner is concerned.

CLERICAL FORCE.

The most striking feature in the organization of the German Office is the centralization which prevails both in the clerical and in the examining work. Our Office has 32 examining divisions each with a chief, his assistants, clerks and material for work housed in the same room; all actions are determined and all letters proceed directly from this room, although they bear the signature of the head of the Office. The 32 divisions are, however, quite independent of each other in their organization and work. In Germany, on the other hand, there is one clerical division for the entire office. Every letter that is written, every entry in the books, every addition to the contents of the file wrapper is made in this clerical division. Although there are 32 examiners and 32 assistants, each occupying a separate room, all of their clerical work is done by this division. If an examiner wants a file he sends to the clerical division for it, and when he has finished it, it is returned there.

BOOKKEEPING.

Since all papers, applications, letters, protests, appeals and the rest come into and are kept in charge of the clerical division, it is evident that a very elaborate system of bookkeeping is necessary. Broadly speaking there are three sets of books, a repertory, an alphabetical book and a number book. So far as I can gather, every paper that ever comes into the Office is entered in each of these books. In one of them applications for patents are given numbers by which they are thereafter known and which correspond somewhat to our serial numbers. Instead, however, of using a number pure and simple, a combination of letter and number is given. Thus, S-512 means that the application is noted on the repertory book S, page 512. This number the applicant is expected to endorse on all of his correspondence relating to the particular application in question, but should he not do so the Office can, by referring to the alphabetical book and from thence to the number book, get back to the quasi-serial number in the repertorial book. The exact method of this indexing is hardly of interest to us since the larger amount of business makes it impossible to centralize our bookkeeping in this manner, and the feeling which I have about the German system is that with any very large increase of business, a new and less complicated system will have to be devised.

Again, all of the pending applications of the German Office are kept in one place and are taken therefrom by the examiners as occasion requires; it is obvious therefore that another system of books is necessary to keep a trace of the location of the different applications. In consequence, if examiner A has an application in his possession and he wishes to have the professional opinion of examiner B, thereupon, he sends the same to the clerical division so that the application may be charged to examiner B who thereupon receives it and is held responsible for it. All paths in the German Patent Office lead through the clerical division.

FLAT FILES.

The system of flat files is in vogue and seems extremely satisfactory. The jacket of the file is made of rather stiff cardboard, carrying a colored back to indicate the group to which the invention belongs, and a so-called tail piece, which hangs over the back of the shelf so that a file can be readily picked out from a lot without having to remove any but the correct file from the shelf. Another sample of the centralization in the German Office is found in the fact that a bookbinder is especially employed to add each new paper to the file as occasion requires, and it is plainly apparent that in this case at least the work is better done than it would be if each individual examiner assumed to manage the pasting brush. On the face of the cardboard file are noted merely the most cardinal facts relating to the application, its date, number, class and the name of the inventor. A separate sheet is pasted inside giving a more detailed statement of the contents.

EXAMINERS.

Coming now to the organization of the examining bureau, we find 32 principal examiners and 32 assistants, one assistant being assigned to each principal examiner. Each of these examiners has under his charge a certain art, just as in our Office. The application first goes to the assistant who reads it and makes the search, setting out his views both as to form and merits in a provisional letter forming a part of the file wrapper. He has little or no oral communication with his chief, as is the practice with us, and a great deal of time is doubtless lost in consequence. The file then travels by way of the clerical division to the examiner in person, who reviews the entire application, reading it as carefully as the assistant did in the first place and making an independent search. A few of the examiners are a little more inclined than others to trust some of the matters of form and search to their assistants, but all agree that they themselves must have a complete and accurate knowledge of the contents of the application and of the state of the art appertaining thereto.

The examiner may or may not adopt the views of his assistant. If the application is to be rejected the examiner informs the applicant of his reasons for the rejection, to do which he may adopt either the letter sent up by the assistant, or a letter, the notes of which he prepares himself, and which is afterwards written out and mailed from the clerical division. A time is set in which the applicant must reply. Should the applicant not reply within the proper time, the application becomes abandoned. Should he reply and still urge his right to a patent or present a more limited claim, the examiner will reconsider the matter, and if he still holds the claim unpatentable and thinks it profitable, he may write again to the applicant, giving him further reasons why his application may not be allowed. This preliminary correspondence between the examiner and the applicant may be carried through a number of letters until, at last, the examiner is ready to allow the application or else to reject the same against the non-acquiescence of the applicant.

CO-EXAMINER.

At this stage the application is referred to another one of the principal examiners, reaching him by way of the clerical division, of course, who, in his capacity of co-examiner, makes what is now a third examination of the entire matter in view of the state of the art developed by the search, and either agrees or disagrees with the first examiner. The matter is then referred to a board consisting of 12 of the principal examiners and a legal adviser for final adjudication.

EXAMINING BOARDS.

The organization of this board is unique and interesting. There are four boards of 12 examiners each, some examiners being members of more than one board. Each board has a sitting once a week, and is presided over by a regularly employed, legally trained member of the Patent Office. Each examiner brings the cases in which he acted as co-examiner before this board and reports all the facts to them, whereupon a vote is taken, the examiner who had original charge of the case being ineligible to vote, although he may argue, and the co-examiner who re-examined the case being eligible both to vote and argue. Every case which is to be rejected against the wish of an applicant or which is to be allowed must be reported to this board and be acted upon by them.

Despite the fact that the sessions of this board are secret, your kind letters secured me admission to its sittings, as well as the secret sittings of several other boards. I was the second person who had had this privilege, the first gentleman having been connected with the Austrian Patent Office, and it may be safely said that the time spent at the sittings of these examining boards was the most interesting and profitably spent of my stay.

THEIR ADVANTAGES.

The advantages of a review of all applications by a body of examiners are obvious. Searches are bound to be more thorough when subjected to the scrutiny of brother officers who may have references in their arts bearing on the question in hand, many cases being ordered back for re-examination, because members of the board happen to think of places in their division where analogous structures may be found. Again, the arguments about questions of patentability will necessarily bring about a more uniform administration on the question of invention, and the questions of law are more likely to be settled correctly. Especially is this true since there acts as president of the meeting a jurist, who employs his entire time at the Patent Office and makes a special study of patent law and practice. In consequence any doubtful case can be explained by him, and the discussion which is evoked cannot fail to be profitable to all present. Finally, there is engendered an *esprit de corps*, which is well-nigh invaluable.

Considering the newness of the German practice and the fact that many of the examiners are men without legal training, drawn from purely technical pursuits, these meetings of the examining boards, or an equivalent therefor, are doubtless indispensable to a proper conduct of the business of the Office. I remember hearing discussions of a number of points of practice quite analogous to points which our Office has decided years ago and which are now with us matters of common knowledge. For instance, there was the question whether a second application by A, filed in the lifetime of his first application, takes the date of the first application, and the question whether a second application by A, filed shortly after the death of his first application, takes the date of the second application. These are very simple matters for the examiners of our Office as well as for those of the German examiners who are in the advance column; but there were a number of others who either had no opinion at all, or else an incorrect opinion, on these questions. This shows the necessity, until all the examiners can be properly trained, to continue some system which compels them to adopt a correct practice.

Other matters which are discussed by the Board of Examiners are those of division or how many independent inventions may be retained in one application. As only one claim is allowed, this is rather a simple question, but nevertheless within this limit the rules which they apply are very similar to those in use with us. The question of genus and species and of several species has been settled in conformity with our practice. The question of independent articles is made to depend on whether the articles have become subjects of independent invention, manufacture and sale.

A cardinal point in favor of these sittings is the superb education of the legal adviser and president of the board. In Germany a lawyer begins his study when he is six years old and finishes when he is 30, during all of which time he is actively engaged upon problems which will either train his mind or give him the knowledge necessary for legal work. When one converses with a German lawyer one is certain to be conversing with a man who has a mind thoroughly trained and qualified to appreciate any legal question, however subtle and intricate. The examiners, on the other hand, had to be taken from the practical arts, some from arts like mining or engineering in which a strict technological education has been required, but others from arts, such as weaving and the like, in which no technological education has been required, and in consequence these examiners are not fitted by education to handle without assistance the complex problems of science and law which are daily placed before them. Until then the members of the German Office, as years roll on, all become equally trained in the work, these examining boards in some form will of necessity have to be continued despite any inherent disadvantages of the system, of which there are a number.

THEIR DISADVANTAGES.

First of all a great deal of time is consumed in these sittings and much of it unprofitably. The work of 12 men has to be reported and passed upon. Taking any given case, there are as a rule not over four men who are interested enough to try to understand it. The rest stand round and listen in a general way, or else do not listen at all. The whole point is practically decided in two-thirds of the cases by from three to five men, and the time of the rest is sub-

stantially wasted so far as these cases are concerned. Of course in a number of cases all of the members listen and vote, but from the very fact that more than four or five people cannot well stand around one drawing as it is being explained, it is plain that it is not usual for all the members of the board to vote on any given case from a full knowledge of the facts gained by a personal examination.

SUPERFICIALTY.

Again, I am of the opinion that this system of examining boards tends to a superficialty in work. In justice to my German brothers, I must say that they strenuously deny any such assumption. When it is considered, however, that 50 applications are handled by one of these boards in a day, and that on one of the days on which I was present nearly a hundred had been handled, I must say that it seems to me on its face that superficialty is a necessity made so by the mere questions of time and amount of work. It is argued that the study of the applications and the investigation into questions of patentability before submission to the board are quite as thorough as with us. But as the result of such study in its nicer features cannot be fully presented to a number of men in the short time at their disposal, the vote which decides cannot be said to be based thereon, and examiners must be discouraged from attempting to make nice discriminations which will not be appreciated by those who after all settle the fate of applications. It is, of course, extremely unpleasant for me personally to say anything in disparagement of the work of gentlemen who have treated me with such unusual courtesy and with such genuine kindness and honest friendship, but the facts, or what appear to me to be the facts, ought not to be hidden.

If such a board were to be of any utility for us in the United States Patent Office, it would have to be of utility in the doubtful cases, in the nice distinctions, in the difficult and intricate problems. In simple things most trained examiners decide alike. Yet it is precisely these nice problems and these fine distinctions that cannot be considered in a meeting of 12 men pressed to get through with a certain amount of work. In nine cases out of ten it is a very fine distinction, indeed, which decides between patentability and non-patentability, and at these meetings I never heard any fine distinctions referred to. For instance, an applicant had a combined knock-down trunk and bed of a certain peculiar construction, the construction being specifically claimed. The co-examiner reported adversely upon the application, having found what he considered a combined trunk and bed and a knock-down bed. The legal adviser called his attention to numerous differences of construction, but the examiner maintained that these were all immaterial; that as soon as the two ideas, separately, were found to be old there could be nothing patentable in combining them, nor in any structure, however new or useful, which affected this combination. The legal adviser showed that under such arguments no new knock-down tables or knock-down boxes could ever be patentable; but time was pressing, and a vote was taken and the application was rejected. All this applied to cases involving even simple structures, if only the question of invention is doubtful.

When it comes to cases involving complicated mechanical constructions, the use of these sittings, or rather the abuse of them, is still more apparent. An application for a complicated machine, the construction of which no one can understand in even a general way without five or ten minutes of the closest kind of attention, is rapidly explained to the assembled examiners, two or three references for the construction are faintly hinted at, the question as it appears to the co-examiner is put and the vote is taken. If either the examiner or co-examiner happens to have a particular interest in the case or to feel more strongly about it than usual, he may make a more vigorous argument in case the decision of the board appears to be going against him, and thus influence the members to make a correct decision. But in so far as this is done, the board is unnecessary; and in so far as it is not done, the board has a mere chance of deciding on an accurate knowledge of all the facts. I am rather inclined to the opinion that, even for the German Patent Office as at present constituted, these meetings had better be confined to advising examiners, and should not include the taking of a vote for determining his action.

APPRECIATION OF DIFFERENCES.

I come now to the matter of appreciating differences. As a brother examiner in the United States Patent Office once said, "In the patent business it is surprising what an amount of knowledge of patents a man is not born with." The ability to see distinctions is an acquired faculty. It comes by training, and it comes more quickly the better trained the man. Whether or not a distinction is important is another matter, a matter of judgment indeed upon which opinions may differ and upon which the official criterion in this country would be what the courts would say in the premises. But a distinction must first be seen before its value can be appreciated. In the United States we have a hundred years of patent practice at our back. We have lived in an atmosphere of patents for so long that the appreciation of differences comes naturally to us. Germany is young in her patent system, both as a nation and individually. In consequence distinctions are not seen so quickly as with us. My German brothers, whenever I called this matter to their attention, always took refuge in the assertion that they really saw the differences quite as well, but that they did not consider them important. Nevertheless, I can safely say that in case after case differences which were apparent enough to me, and which I am satisfied United States courts would have sustained as patentable, were never referred to. And furthermore I may say that several specific cases which the German examiners had considered unpatentable, they afterwards considered patentable when I took the liberty of calling their attention to a number of differences which I had noticed and they seemed to have overlooked. Thus, for instance, a push button made of three parts, a screw, a piece of wood, and a piece of tin had been rejected on another push button made of six parts, the one costing perhaps two cents and the other 25 cents to manufacture, and there being an electrically different principle. When the attention of the examiner was called to these various differences, he recognized their patentability. In this respect the meetings of the examining boards are of some utility, because the legal adviser, having a more rigorous training than the examiners, detects the various differences and attempts to call them to their attention. As a rule, of course, the lawyer points out these differences, and the examiners, who are technical men, say they are of no importance. But still it is good practice in detecting differences, which is a prerequisite to giving them their proper value.

TEST OF INVENTION.

That the Germans are more strict in matters of patentability than we in this country is undoubted. Of course, there are different elements in our country causing a fluctuation in the opinion as to what is patentable and what is not patentable, but it is safe to say that the strictest constructionist in the United States is more liberal than the most liberal constructionist in Germany. In fact I fear that if the Germans would send their cases to us to be searched, that with the increased number of references with which we should supply them, it is rather doubtful if they would grant any patents. It is instructive also to note that there has been a fluctuation in Germany in the degree of strictness with which the question of invention has been interpreted. When this patent system was first organized great liberality was shown, and patents were granted on the smallest margins. Then a tremendous reaction set in, and nothing short of a revolution in an art was considered adequate. Now the tendency is toward a milder interpretation of the law. With this sample before us we in the United States may, perhaps, hope that our courts, who began with an extreme liberality for inventors, and who with great suddenness, in 1882, turned about as far as it is possible to turn in the other direction, may ere long let the pendulum swing back towards its original place.

APPEALS.

The German law provides for an appeal from the unfavorable decision of the Board of Examiners, which goes to an appellate tribunal, of which there are two, one for each two of the examining boards. They consist of some 28 members, who are selected from among the workers in the practical arts, and are supposed to have more than a mere paper knowledge of the subjects. Some are professors at universities or technical high schools, at mining schools, or veterinary colleges; 10 of them are owners of factories, and the rest are railroad engineers or high officials in the telegraphic, architectural or admiralty offices. For each particular appeal a college of three of these gentlemen is selected, to which two lawyers are added. An oral hearing must be had, and as the appeal board has sufficient time, by reason of its small number of cases, it writes out lengthy opinions. Its decision is final and subject to no appeal.

The statistics as to the number of rejected applications and the number of appeals are not as yet complete under the operation of the present law, which has been in force about two years. It may be said generally, however, that about 40 per cent of the rejected applications are appealed, and that about one-fourth of these appeals are allowed. This shows a marked difference between the German and the United States practice, and while it may show that we are too liberal in allowing patents or else that our applicants are not sufficiently careful of their own interests, it undoubtedly also shows that the German Office is entirely too strict.

PUBLIC INSPECTION.

When a patent is considered to be in a condition for allowance either by the favorable action of the examining board or by the action of the appeal board, it is laid open to the public inspection for two months. This does not constitute a publication in the sense of a printed publication however. During these two months the public have free access to the papers, and may, upon the payment of a certain fee, complain against the issue of the patent, stating the reasons therefor. The examining board then reconsiders the matter and decides the question. If the patent is still deemed allowable, it is thereupon granted; if it be deemed not allowable, an appeal lies to the appeal board.

DEPENDING PATENTS.

Another matter which is under jurisdiction of the examining board is that of the dependence of one patent upon a prior patent granted to the same applicant. The law seems to require that if the improvement by the same applicant is covered by the claim of the original patent that the subordinate patent shall be limited to expire with the expiration of the term of the original patent, and the law further seems to require that the Patent Office shall determine whether a second patent is subordinate during the examination of this patent, and shall endorse this fact upon the face of the patent. This constitutes one of the most difficult and to some extent annoying features of the Patent Office work, because it compels the examiners to consider the question of infringement. In fact, the test whether a second patent is subordinate in the sense of the law, is whether the second construction infringes the claims of the original patent, or whether the claims of the original patent are readable upon the construction of the subordinate patent. I was assured that the examiners did this work with extreme care, but from my own observation, the examining board disposed of such questions without any very critical examination. It took but a few seconds to decide such questions when, as a matter of fact, a trained lawyer would have taken, at least, as many minutes, not to say hours, therefor. Nevertheless, the German industries demand this work of the Patent Office and it seems likely, therefore, to be continued.

(To be continued.)

The Westinghouse Interests in New York.

The United Electric Light and Power Company, using the Westinghouse apparatus in New York, has been reorganized, it is said, without floating debt and with ample capital for the establishment of additional plant. The Westinghouse company has sold to it eight of the World's Fair generators and a complement of other electrical machinery, shipment to begin as soon as the new power house of the United company is under roof. This power house will be the most extensive in the United States, and planned for apparatus of an aggregate capacity of 20,000 horse-power, one-half of which is now being put in.

It is said that the Westinghouse company in the reorganization plan received bonds with a bonus of stock for its bills and accounts receivable against the United company, which have heretofore been put among its unavailable assets, and will receive pay for its World's Fair apparatus in bonds and stock on the same basis as cash subscribers. There will thus come into the company's possession bonds, preferred and common stock of a total value of nearly $1,000,000.

The United company as reorganized will have outstanding bonds and capital stock below those of the Edison Illuminating Company, while its capacity in power and lighting apparatus will exceed that of its rival. Mr. G. W. Hebard, second vice-president of the Westinghouse Electric and Manufacturing Company, has been made president of the United company.

ELECTRICAL REVIEW

Published at 13 Park Row,
P. O. Box 2339. NEW YORK.

EDITOR:
CHARLES W. PRICE.

ASSOCIATE EDITOR:
STEPHEN L. COLES.

REGISTERED CABLE ADDRESS:
"ELECTVIEW," NEW YORK.

1546 "CORTLANDT," TELEPHONE CALL.

BOSTON OFFICE:
H. G. TUCKERMAN, Room 29, 620 Atlantic Ave.

WASHINGTON OFFICE:
GEO. C. MAYNARD, 800 H St., N. W.

ADVERTISING DEPARTMENT,
H. T. RICHARDS, Manager.

SUBSCRIPTION TO THE
ELECTRICAL REVIEW.

One Year, United States and Canada, - $3.00
One Year, Foreign Countries, - - 5.00
Single Copy, - - - - - - - .10
Back Copies, each, - - - - - - .25

NEW YORK, AUGUST 8, 1894.

CONTENTS.

PAGE

Views, News and Interviews ... 61
The Sweet Limit Switch ... 61
Siemens & Halske Works Bured ... 61
The General Electric Fan Motor ... 61
The Association of Edison Illuminating Companies ... 62
The Waddell-Entz Company ... 62
A Ball-Bearing Telephone ... 62
Electricity *vs.* Cable in Transmission ... 62
Large Electric Railway Work in Chicago ... 62
Receivership for the Ries Company ... 63
Who Manufactures Electrical Carriages? ... 63
Some Experiments in Electric Photography ... 63
Does Advertising Pay? ... 63
That Detroit Lighting Plant ... 63
The German Patent System ... 64
The Westinghouse Interests in New York ... 65
Flying ... 66
A Storage Battery Station in New York ... 66
The World's Fair Wire Awards ... 67
Puzzled Electricians ... 67
Failure of the Royal Arc Electric Company ... 67
New Engine Pamphlet ... 67
A Highly Successful Company ... 67
Personal ... 67
Pennsylvania Street Railway Association ... 67
American Electro-Therapeutic Association ... 68
A Cable Anniversary Celebration ... 68
Telephone News and Comment ... 68
Electric Railway Notes ... 69
The National India Rubber Company ... 69
The Bachelder Spring Indicator ... 69
A Large Alternator ... 69
Telephone Service in Chicago ... 70
A Reduction that Didn't Reduce ... 70
Our Boston Letter ... 71
Electric Light Flashes ... 71
Will Resume Manufacturing at Once ... 71
Kindred Interests ... 72
Electrical Patents ... x
Advance Information ... x

INDEX OF ADVERTISERS.

COVER PAGES. PAGE

Abendroth & Root Mfg. Co., boilers ... xvi
American Electrical Works, insulated wire ... i
Ansonia Brass & Copper Co., wire ... xvi
Armington & Sims, engines ... xvi
Beacon Vacuum Pump and Electrical Co., incandescent lamps ... i
Bunnell & Co., J. H., dry batteries ... i
Campbell Electrical Supply Co., insulating tape ... i
Day's Kerite, insulated wire ... I, ii
Eastern Electric Cable Co., insulated wire ... xvi
Eddy Electric Mfg. Co., motors ... i
General Electric Co., electric railway equipments ... xv
Globe Iron Roofing and Corrugating Co ... i
Goubert Manufacturing Co., heaters ... xvi
Hammond Cleat and Insulator Co., waterproof sockets ... i
Hampson & Co., E. P., engines ... xvi
McKenney & Waterbury, lamps and fixtures ... i
National India Rubber Co., wires and cables ... i
Okonite Co., insulated wire ... i, xvi
Rhode Island Tool Co., tools ... i
Stirling Co., boilers ... xvi
Weston Engine Co., engines ... i

INSIDE PAGES.

American Bell Telephone Co ... iv
American Carbon Co., carbons ... viii
American Watch Tool Co., bench lathes ... xiv
Ashcroft Mfg. Co., gauges ... xiv
Baker & Co., platinum ... 72
Berlin Iron Bridge Co., iron roofs and buildings ... xiii
Billings & Spencer Co., commutator bars ... xiv
Bishop Gutta Percha Co., wire ... vii
Bolgiano Water Motor Co., fan motors ... x
Bradbury-Stone Battery Co ... x
Brown & Sharpe Mfg. Co., machinery and tools ... xiv
Brush Electric Co., arc lamps ... vi
Bryant Electric Co., electrical specialties ... xiv
Buckeye Electric Co., incandescent lamps ... viii
Buckeye Engine Co., engines ... ix
Case, J. T., Engine Co., engines ... xi
Central Electric Co., electrical supplies ... iii
Clark Electric Co., arc lighting ... iv
Clonbrock Steam Boiler Works, steam generators ... iv
College of Engineering ... 72
Columbia Telephone Mfg. Co., telephones ... xii
Connecticut Pipe Mfg. Co., cement lined ducts ... xi
Consolidated Electric Storage Co., batteries ... vi
Correspondence School of Electricity ... 72
Correspondence School of Mechanics ... 72
Correspondence School of Technology ... x
Davis, Lewis K., consulting engineer ... xiv
Dixon, Jos., Crucible Co., belt dressing ... iv
Edson, Jarvis B., recording gauges ... vii, xii
Electric Construction and Supply Co., arc lamps ... iii
Electrical and Mechanical Engineering and Trading Co ... ix
Electric Storage Battery Co., chloride accumulators ... v
Empire China Works, porcelain specialties ... iv
Falls Rivet & Machine Co., friction clutches ... vii
Faraday Carbon Co., carbons ... vii
Garvin Machine Co., machine tools ... iii
General Electric Launch Co., electric launches ... 72
Greeley & Co., The E. S., electrical supplies ... xiii
Harrisburg Foundry & Machine Works, engines ... vi
Harrison International Telephone Co., telephones ... iv
Hart & Hegeman Mfg. Co., snap switches ... xiv
Helios Electric Co., arc lamps ... xiv
Hornberger Electric Co., Elkhart transformers ... ix
Huebel & Manger, bells, push buttons, etc. ... xiv
Hulbert Fence and Wire Co ... vi
Interior Conduit and Insulation Co., Lundell dynamos and motors ... xiv
Keasbey & Mattison Co., magnesia sectional coverings ... 71
La Roche Electrical Works, generators and motors ... xiv
Leclanché Battery Co., batteries ... xiv
Leffel & Co., James, water wheels ... xiii
Lehigh Valley Creosoting Co., creosoted lumber ... x
Leonard & Co., H. Ward, contractors ... x
Manning, Maxwell & Moore, tools and supplies ... xiv
Marshall, Wm., condensers ... x
Michigan Central R. R. Co., Michigan and the West ... 72
Moore, Alfred F., wire ... ix
Mutual Life Insurance Co ... vi
National Conduit Mfg. Co., tubes for electric subways ... xi
National Pipe Bending Co., feed-water heater ... ix
National Telephone Mfg. Co., "The National." ... iii
New England Engineering Co ... iii
New York Belting and Packing Co., rubber belts ... iv
New York Insulated Wire Co., wires and cables ... xiii
New York & New England R. R. ... 72
New York & Ohio Co., Packard lamps ... viii
Novelty Electric Co., electric supplies ... xiv
Ostrander & Co., W. R., supplies ... vi
Oxford Mfg. Co ... 72
Palmer Bros., telephones ... x
Perkins Electric Switch Mfg. Co., switches and sockets ... xiv
Pettingell-Andrews Co., Lundell motors ... xiii
Phillips Insulated Wire Co., wire ... viii
Phoenix Glass Co., globes and shades ... xi
Queen & Co., volts and ammeters ... viii
Riker Electric Motor Co ... xiv
Robinson & Orr, steel rails ... vi
Royce & Marean, electrical supplies ... vi
Schieren & Co., Chas. A., leather belting ... 72
Schoonmaker, A. V., India mica ... xiv
Self-Winding Clock Co., clocks ... xiv
Solar Carbon and Mfg. Co., carbon specialties ... xiv
Splitdorf, C. F., electro-magnets ... x
Standard Paint Co., insulating compounds ... v, xii
Stanley Electric Mfg. Co., two-phase generators ... ix
Thompson & Bushnell Co ... xiv
Wanted—Tender for electric light plant ... vii
Warfield, L., Detroit, railway motors ... viii
Western Electric Co., supplies ... iv
Western Telephone Construction Co., telephones ... iv
Westinghouse Electric & Manufacturing Co., multiphase motors and generators ... xi
Weston Electrical Instrument Co., measuring instruments ... viii
White-Crosby & Co., contracting engineers ... 72
White Dental Mfg. Co., acid gravity battery ... vi
Williamsport Wooden Pipe Co., creosoted conduits ... xiv
Wyckoff Pipe Co., inc., creosoted tubing ... ix

We have heard some criticisms of electric elevators lately. The ELECTRICAL REVIEW would be pleased to publish the views of the inventors in this important line of electrical enterprise.

We are informed that the severest test which the World's Fair insulated wires met with was Chicago hydrant water; but we presume Chicago electricalites will say this is a base calumny.

At the opening of the bids for the construction of the electric plant at Hamilton, Ohio, it was found that the number footed up over 50. There is apparently a desire on the part of the electrical brethren to get to work.

The electrical manufacturing companies are getting ready for an increased business this Fall. The REVIEW believes they will get it—if they let the public know what they have through the proper medium.

Are we to have telephones in trolley cars? There are some very pretty electrical problems here. Brooklyn, with its many long lines of electric railway, would be an admirable place to try the experiment, and General Manager Sargent, of the telephone company, is just the man to give the idea a thorough test.

The most important electrical news last week was the announcement of the awards to the insulated wire manufacturers. The ELECTRICAL REVIEW published the awards in full. Our contemporaries were evidently enjoying a Summer nap, or were listening to the wild waves. Not one had a word about the awards.

There are some lively times ahead electrically. A few electric railway patents that have been lying idle for three years or more from lack of capital, have been purchased, we are creditably informed, by the Ft. Wayne Electric Corporation, and these may show a fundamental strength that will disturb two or three of the larger manufacturing companies. They will have energy and capital back of them now.

The failure of the Royal Arc Electric Company seems to be another case of bad management, hurtful to the chances of a meritorious invention. In justice to Mr. James I. Ayer, the new general manager of the company, it should be said that the true condition of the company was not disclosed to him until after he took charge. We hope to see the company placed on its feet again, and we understand that is the expectation of the gentlemen interested.

Detroit, Mich., is afflicted with a new street car ordinance every few days. Consequently rapid transit languishes, and the poor car horse is still unrelieved.

Electrical Examiner Gustav Bissing, of the United States Patent Office, has made an interesting report of an inspection of the German Office. The comparative merits of the systems of the two countries are clearly set forth. The report appears in the ELECTRICAL REVIEW.

FLYING.

It is cabled from Europe that Hiram Maxim has succeeded in making his flying machine fly—a feature that has not prevailed in the operation of similar machines by other ambitious inventors. The ELECTRICAL REVIEW has for many years been waiting for the advent of the air machine. Although often cast down by doubts and misgivings through the failures and funerals that mark the efforts along this atmospheric line, we have always had faith that the means would yet be found to travel through the air with safety, speed and economy. If Hiram Maxim—the inventor of the Maxim gun and an able electrician—announces that his flying machine is a success, the scientific world will believe him and await with interest and confidence the substantial proof of his assertions.

A STORAGE BATTERY STATION IN NEW YORK.

A new thing in electric lighting in New York city is about to be inaugurated by the Edison Electric Illuminating Company, namely, the establishment of a storage battery plant on Eighth street near Fourth avenue. In this portion of the company's territory there is a demand for incandescent lighting, but not heavy enough to require an additional expensive electric light station. So this weak spot in the generally very comprehensive Edison system of the city is to be strengthened by a heavy storage battery installation which will supply current in that section as called upon. The Electric Storage Battery Company, of Philadelphia, manufacturers of the chloride accumulator, supply the batteries. The Edison officials have given the matter careful consideration and think the new storage battery station will be a pronounced success and the battery manufacturers have every confidence in the efficiency of their product.

Boston has a Wire Commissioner, J. R. Murphy by name. The new commissioner is to have an assistant, and has a big job before him. He is expected to bury all the wires in a very short time. The Boston press is now hugging itself in the belief that the city is soon to be freed from all overhead wires.

Inventors of telephone systems are still inventing. But the battery transmitter is a stumbling block.

The trolley continues to conquer time and space.

Read the ELECTRICAL REVIEW for news.

THE WORLD'S FAIR WIRE AWARDS.

THE NATURE OF THE TESTS THE INSULATED WIRES AND CABLES RECEIVED—KERITE'S TRIUMPH.

The list of awards to the manufacturers of insulated wire, which was published exclusively in the ELECTRICAL REVIEW last week, has naturally attracted a great deal of attention from all makers and users of such wires. The wires tested were Kerite, Okonite, Grimshaw, Simplex, Safety, E. M. W. (Edison Machine Works), Paranite, Washburn & Moen Salamander and Washburn & Moen rubber covered and Roebling's Crescent.

It will be seen that there were 10 varieties of wire in the test, Kerite carrying off the highest honors, and receiving the award of two medals. Naturally Proprietor W. R. Brixey and General Agent J. E. Ham are much elated over the result, and have been in receipt of numerous congratulations.

Although the figures of the test have not been given out for publication, the nature of the test made at the Chicago Exposition was as follows:—

1*st Test.*—Breakdown test, using Westinghouse 2,000 volt alternating current in connection with Westinghouse step-up transformer.

2*d Test.*—Continuous high pressure—6,000 volts—wires run in ordinary water.

3*d or Soak Test:*

1st. Solution 10 per cent sulphuric acid.
2d. Solution 10 per cent ammonia.
3d. " saturated solution lime.
4th. Subway refuse dissolved in Chicago hydrant water.
5th. Subway Chicago hydrant water.

The time of the test was 100 days, and the wires were tested weekly by a galvanometer, and the figures recorded from computing the results.

The sub-committee of judges appointed to make the tests on wire of all kinds for electrical purposes was composed of Prof. D. C. Jackson, of the University of Wisconsin at Madison; Prof. Benjamin F. Thomas, Professor of Electrical Engineering and Director of the Physical Laboratory in the University of Ohio at Columbus; Prof. M. O'Dea, Professor of Electrical Engineering in the University of Notre Dame, Indiana; and Prof. R. B. Owen, of the University of Nebraska at Lincoln.

This committee was appointed by Prof. H. S. Carhart, president of the Board of Judges for the Electrical Department, under authority of the Executive Committee of Awards, and a specific appropriation of money was made to defray the expenses of exhaustive tests.

The capitalistic name of Rockefeller is identified with a new telephone company in Ohio, organized to run from Cleveland through Lorain, Huron, Seneca, Allen and Van Wert Counties to the State line. Other Standard Oil Company magnates are interested, and it is said that these alert gentlemen have gazed longingly on the preserves of the American Bell Telephone Company for several years. There may be a hint here for the inventor with a telephone system that excels the Bell and does not infringe—if any such there be.

PUZZLED ELECTRICIANS.

QUEER ANTICS OF THE MACHINERY IN THE ST. LOUIS UNION DEPOT RAILROAD POWER HOUSE.

The electricians, engineer-in-chief and the managerial department of the Union Depot Railroad Line are puzzled over the antics of the electrical apparatus contained in the mammoth power house at Geyer and Missouri avenues, says the *Globe-Democrat* of St. Louis. From the action of the generators within the past three days any set of men, except those who have charge of affairs at the power house, who must, perforce, be persons of a high order of intelligence, would have come to the conclusion that the apparatus has received a "spell," been bewitched or "hoodooed." That the numerous machines, generators of the current to propel the almost countless cars of the Union Depot line, the Cherokee and Grand avenue line, the Tower Grove line and the Mound City line, have acted queerly on several occasions of late is fully attested by the experience of the many thousands of passengers of those lines who were riding on the the cars when the generators all of a sudden ceased to grind out force, which becalmed every car on all of the above-mentioned lines. The passengers wondered at this, waited, some fretted a little, but the majority took the embargo placed on their journeying good humoredly, as the services rendered by the company is first-class and break-downs few and of a trifling character. The "trouble" as it is termed by the employés, came at an hour of the day when the cars are most liberally patronized, namely, a little after six P. M.

The electricians and managers worked like Trojans to remedy the fault and start the system up again, as every minute's delay counts for much on a rapid transit road. They manipulated the switchboard, examined all parts of the apparently mulish generators, cut them in and out, tested, coaxed, excited their fields, put in new fuses, trotted out deflecting galvanometers, hunted for grounds, leaks and the like, however to no avail. Their labor was not rewarded by locating the evil. The large engines revolved the armatures of the generators, and aside from flashes at the brushes no current could be coaxed from them. All at once the obstinate generators went to work with a will and earnestness as if they possessed life and had concluded to attend to business. The anxious and perspiring electricians, engineer and superintendent were surprised and pleased. They were wondering what stopped the flow of energy, and began evolving theories, when all of a sudden the generators again refused to act. Dismay quickly followed congratulations. Again testing and inspection followed, which continued for some time, when again the generators began to work. After a short while out went the power, to return in 10 to 20 minutes' time. On Tuesday night the current flew on and off seven times between 6.20 and 9 o'clock. After that the generator worked steadily and continuously. Wednesday evening at about the same time the generators began cutting capers as on the evening previous, until after two or three short stops the current could be held on the wires.

Mr. John Scullin, the president of the company, says that on Wednesday night a wire was down, but of Tuesday's "troubles" no clear explanation can be given. Yesterday there were some line troubles, but no delays followed. Mr. Scullin also said that he never had any mutinous machinery before, and he hoped that the "spell," if it was a "spell," is off for good, but he attributes all the mystery to grounded wires.

The dynamo tenders have not forgotten their scare yet, while the electricians do not know what to make out of the performance, and, like Mr. Scullin, hope they have seen the last of the mystery.

Failure of the Royal Arc Electric Company.

This company has gone into the hands of a receiver on request of Pliny Fiske, a creditor for about $1,000. The receiver is Mr. Foster M. Voorhees, of Elizabeth, N. J., and all claims against the company must be proved before him within 60 days of July 26. It is estimated that the indebtedness is about $80,000, with no tangible assets outside the patents on the incandescent arc lamp.

New Engine Pamphlet.

The James Leffel & Company, of Springfield, Ohio, have issued a fine and complete new pamphlet, illustrating and describing their well-known line of upright and horizontal steam engines and steel boilers with latest improvements, which were awarded diploma and medal at the World's Fair. A copy may be had free on application to the company. It is well worth sending for by any one needing an engine or boiler.

A Highly Successful Company.

The Berlin Iron Bridge Company, of East Berlin, Conn., are running full time, and have a shop full of work. Among other large contracts which they have now on hand we may mention the following:

The new plant for the Fairfield Copper Company at Monroe, Conn.

A new power house for the Hartford Street Railway Company at Hartford, Conn.

A new dynamo and boiler room for the Larchmont Electric Company at Mamaroneck, N. Y.

A new power house for the Bridgeport Traction Company at Bridgeport, Conn.

The new power house for the Nassau Electric Company at Brooklyn, N. Y.

The new power station for the United Electric Light and Power Company, of New York city, N. Y.

Besides this the company have a large amount of work outside on the ordinary electrical lines; and while prices are very low, yet they report the general run of their business as about the same as during other years.

PERSONAL.

Mr. Frederick Bathurst, of London, Eng., is again renewing his acquaintance in this country and taking note of our electrical development.

Mr. John B. Wallace, of the Wallace Electric Company, Chicago, was a visitor in the metropolis last week. His company is meeting with much success.

Dr. Cornelius Herz has been sentenced by the French court to pay a heavy fine and to spend five years in prison. Herz is in England and will appeal. He is accused of levying blackmail on French officials.

Mrs. Margaret A. McKinlock, mother of the Messrs. McKinlock, of Chicago, died at the residence of her son Walter, on Saturday, July 28. The devoted sons will receive the sincere sympathy of a large circle of friends.

Mr. Frederick S. Minott, general manager of the National India Rubber Company, of Bristol, R. I., was a visitor in the Summer resort of New York city last week. The "N. I. R." insulation is meeting with much favor in all parts of the country.

Dr. Gustav Bissing, principal examiner of electrical applications in the Patent Office, sailed for Europe last week on the "Lucania." He goes on official business, having been directed by the Commissioner of Patents to investigate the methods of the patent system in England and report thereon to the department.

President R. T. McDonald, of the Fort Wayne Electric Corporation, packed his valise and rushed away to New Orleans early in the week. As the leading spirit in a traction company and an ice factory there, his presence was needed, but he will be back within the week, aggressive as ever and ready to spring any number of surprises on his friends in the electric world. His success is as continued as it is remarkable.—*New York Recorder.*

Mr. E. I. Garfield, secretary of the Thomson-Houston company and the General Electric Company for a dozen years or so, has accepted the New England agency of the Fort Wayne Electric Corporation and will make his headquarters at No. 17 Federal street. The Fort Wayne is to be congratulated. Mr. Garfield is one of the best posted men on electric light and power plants to be found in the business, and his alliance with this company undoubtedly means an aggressive New England policy.

Pennsylvania Street Railway Association.

The Executive Committee of the Street Railway Association of Pennsylvania, consisting of Robert E. Wright, of Allentown; B. F. Meyers, Harrisburg; William Lanneus, York; S. P. Light, Lebanon, and Richmond I. Jones, Reading, met on July 28, in the office of the traction company, at Reading, and made preliminary arrangements for the meeting of the association in that city on September 5, 6 and 7. The headquarters of the association will be at the Neversink Mountain Hotel.

American Electro-Therapeutic Association.

The following is the preliminary programme of the American Electro-Therapeutic Association, which will hold its fourth annual meeting at the New York Academy of Medicine, New York, September 25, 26 and 27:

President's address, Dr. W. J. Herdman, Ann Arbor, Mich., Professor of Diseases of the Mind and Nervous System and Electro-Therapeutist in the University of Michigan; "On Standard Coils," Dr. Wm. Jas. Morton, New York; "On Standard Meters," Dr. Margaret A. Cleaves, New York; "On Standard Electro-Static or Influence Machines," Dr. Wm. Jas. Morton, New York; "On Constant Current Generators and Controllers," Dr. W. J. Herdman, Ann Arbor, Mich.; "On Standard Electrodes," Dr. A. Lapthorn Smith, Montreal; "Stand and Electrode for Static Electricity," exhibit of same, Dr. Lucy Hall-Brown, Brooklyn, N. Y.; "On Electric Light as a Therapeutic and Diagnostic Agent," Dr. Margaret A. Cleaves, New York; "Constant Current Distribution," Mr. W. J. Jenks, M. I. E. E., New York; "Physiological Effects," Prof. H. E. Dolbear, President Tuft's College, Boston, Mass.; "Therapeutic Uses," Dr. A. Rockwell, New York; "The Galvanic Current in Catarrhal Affections of the Uterus," Dr. G. Betton Massey, Philadelphia; "Suites e'loignees du Traitement Electrique Conservateur Gynæcologie Grossesses Consecutives," Dr. Georges Apostoli, Paris; "Metallic Electrolysis," M. le Docteur Georges Gautier, Paris, Dr. Wm. Jas. Morton, New York, Dr. Margaret A. Cleaves, New York, Dr. A. H. Goelet, New York; "Treatment of Urethral Stricture," report to date, Dr. Robert Newman, New York; "Diseases of the Eye, Electro-Therapeutics of," Dr. L. A. W. Alleman, Brooklyn, N. Y.; "Notes on Goitre and Improvements in Apparatus for Treatment of Same," Dr. Chas. H. Dickson, Toronto; "Diseases of the Throat," Dr. D. S. Campbell, Detroit, Mich.; "The Action of Electricity on the Sympathetic," Dr. A. D. Rockwell, New York; "The Treatment of Neuritis by the Galvanic and Faradic Currents," Dr. Landon Carter Gray, New York; "Electric Sanitation," Prof. John W. Langley, Ph.D., Case School of Science, Cleveland, Ohio; "Physics of the Electric Light in Relation to Organized Matter," Prof. John O. Reed, Ph.M., Assistant Professor of Physics, University of Michigan; "Physics and Appliances," Mr. Newman Lawrence, M. I. E. E., London; "Special Hydro-Electric Applications," Dr. Margaret A. Cleaves, New York; "The Hydro-Electric Therapeutics of the Constant Current," Dr. W. S. Hedley, Brighton, England; "Physiological Effects of Interrupted Currents," Dr. W. J. Engelmann, St. Louis, Mo.; "General Faradization," Dr. A. D. Rockwell, New York; "Gynæcological," Dr. A. H. Goelet, Dr. H. E. Hayd, New York, Dr. A. Lapthorn Smith, Montreal; "Sinusoidal Current," Mr. A. E. Kennelly, F. R. A. S., Philadelphia; "Physiological Effects," Dr. W. J. Herdman, Ann Arbor, Mich., Dr. J. H. Kellogg, Battle Creek, Mich.; "Therapeutic Uses," Dr. Margaret A. Cleaves, Dr. Wm. Jas. Morton, New York; Dr. J. H. Kellogg, Battle Creek, Mich.; Dr. Holford Walker, Toronto; Dr. A. H. Goelet, New York; "Le Courants Alternatifs: leur Transformation; leur Mesure et leurs Applications Therapeutiques," M. le Docteurs Gautier et Larat, Paris; "On the Sinusoidal Current Method of Regulation, the Electro-Motive Force and Resultant Current," Dr. Lucy Hall-Brown, Brooklyn, N. Y.; "Static and Static Induced Currents," Prof. Edwin Houston, Ph.D., Philadelphia; "General Therapeutic Uses," Dr. W. J. Morton, New York; "The Treatment of Chorea," Dr. D. R. Brower, Chicago; "Static Induced," Dr. Margaret A. Cleaves, New York; "High Frequency Currents Derived from Static Machines as per Method d'Arsonval," Dr. J. H. Kellogg, Battle Creek, Mich.

A Cable Anniversary Celebration.

A most brilliant gathering assembled at the Imperial Institute, London, on the evening of July 20, to celebrate the 25th anniversary of the establishment of submarine cables to the far East.

Royalty was well represented. His Royal Highness, the Prince of Wales, the Duke of Cambridge and several other members of the royal family honoring the gathering by their presence.

Sir John Pender, the Marquis of Tweeddale, and the directors of the companies, after having presided at a sumptuous banquet, received the guests invited to a larger gathering for the evening fete in the Institute, which was thronged by the leading lights of the diplomatic, political, scientific and art world, the whole affair being a great success.

The grounds were tastefully illuminated, and stationed at different points were bands discoursing music to enliven the proceedings and give eclat to the whole scene.

Sir John Pender met with a very warm reception, when rising to respond to the toasts proposed by the Lord Mayor, Lord Wolseley and others. He described the early struggles of the companies and the conspicuous part played by the United States. Many men, he declared, had done important service to the companies. Sir James Anderson showed it to be possible to pick up and repair the parted cable in 2,000 fathoms of water in 1865. Lord Kelvin, Cromwell Varley, Fleeming Jenkin and many others had been of especial service. There were now 11 cables in the Atlantic and another being laid, which, with duplex working, was equal to two ordinary cables.

The Eastern company's nucleus 25 years ago was 900 miles of cables and £260,000 capital. Now it is 51,325 miles of cables and a capital representing nearly $15,000,000.

Mr. Bayard, the United States Minister, responding to the toast of the evening, "Submarine Telegraphy," said in the temple of science there were chambers of delight and pathways of pleasure by which they might be led to contemplate the results of the most vigorous exercise of the human faculties.

He must not, he said, be unmindful of his own countrymen. The first and most prominent in cable service was Cyrus W. Field, whose name he was glad to mention in that assembly.

He could but reflect that submarine messages between the United States and England needed no translation, and let those who used that tongue see that nothing was conveyed unless it could be clearly understood.

TELEPHONE NEWS AND COMMENT.

The long-distance telephone wires are being rapidly strung through Ohio and Indiana. St. Louis will soon be reached.

At Hamburg, Pa., the borough Council at a special meeting decided to tax all telegraph, telephone and electric light companies one dollar for each pole.

The Farmington Telephone Company, of Farmington, Fayette County, Pa., has been chartered with a capital of $800. The American Bell will have to succumb now.

President Hudson, of the American Bell Telephone Company, and President Cutler, of the Metropolitan Telephone and Telegraph Company, are enjoying vacations in Europe.

The Association of Old-Time Telegraphers will hald its annual reunion in Baltimore on September 12. The Society of Military Telegraphers will meet at the same time.

The first "opposition" or magneto telephone exchange built in Texas is owned and operated by E. L. Bacon and J. F. Keith. They began business on July 1 with 75 subscribers. The new exchange is said to be a success.

E. T. Gilliland, the well-known telephone inventor and manufacturer, has renewed his relations of several years ago with the American Bell Telephone Company, and will devote his time to this company's interests at his laboratory at Pelham Manor, N. Y.

The new Sandusky, O., Telephone Company will charge $2.50 a month against $4 charged by the present company; $1.50 a month will be the charge for residence telephones. There are evidently good times coming for those who love to talk in Sandusky.

The National Telephone Manufacturing Company, of Boston, has just received an order for 1,000 receiver and transmitter telephones for use in the new Hotel Majestic, New York city. This order speaks well for the efficiency of the National telephone.

The Lowville and Watson Telephone and Telegraph Company has sold to W. H. Wheeler and L. B. Parker the telephone line running from Lowville to New Boston, with the privilege of extending the line to Barnes Corners and there connecting with the New York Central system.

The telephone war at Elwood, Ind., is still on. The Central Union Telephone Company has an exchange in operation and now the Magneto company are putting in one. The former company now has 58 patrons and the latter company already has 50. The companies are hostile and their rivalry may result in cheap telephone rates for Elwood.

The Louisiana Telephone Company, composed of merchants, manufacturers and citizens generally of Louisiana, Mo., have decided to proceed at once to construct a new plant, and expect soon to have their exchange in operation. The new company will have at least 50 instruments to start the exchange, and others are promised. Its subscribers include every subscriber of the present exchange.

The telephone circuit between Burlington and Montpelier, Vt., is to be entirely rebuilt for long-distance service. This transformation will be begun at once and made as soon as possible. The changing of the line from Rutland to Bellows Falls, which will give Burlington direct long-distance telephone communication with Massachusetts cities, to a metallic circuit will be completed in about two weeks.

Under Massachusetts laws it is not necessary that directors hold any stock in a corporation which they direct, but stock stands in the name of the present directors of the American Bell Telephone Company, as follows:

Thomas B. Bailey	15
Francis Blake	824
Charles P. Bowditch	100
George L. Bradley	...
Alexander Cochrane (& Co.)	1500
William H. Forbes	3725
Henry S. Howe	110
Charles Eustis Hubbard (clerk)	577
Gardiner G. Hubbard	690
John E. Hudson (president)	15
Charles E. Perkins	750
Thomas Sanders	12

The United Electric Corporation is incorporated under the laws of the State of Minnesota; the charter provides for manufacturing and dealing in all kinds of electrical machinery and appliances. For the present the company will confine its operations to telephones and telephone supplies. The company is well organized and starts out under most favorable auspices, having the necessary sinews of war—capital and talent. Mr. Sam. Grant, the president of the company, is a prominent capitalist in the northwest, and Paul W. Bossart, the manager, is a widely-known electrician and a pioneer in the telephone business. The headquarters of the company will be in Minneapolis.

Philip Fitzsimmons, the telephone inventor who came to Cincinnati from Birmingham, Ala., nine months ago to put his invention upon the market, has at last succeeded in getting capitalists to take hold of it. James Pettibone, of the Pettibone Manufacturing Company, and R. N. Archer, the lumber dealer, have organized a company with a capital of $100,000, and the manufacture of telephones will be begun by the company. Fitzsimmons was elected chief electrician and given a big block of stock of the concern for his patent. It is not known how far the work will be pushed, but the Cincinnati papers say it will finally make serious opposition for the Bell company. Captain Stone, you had better lookout!

ELECTRIC RAILWAY NOTES.

The Westminster and Union Mills Electric Railway Company, with a capital stock of a quarter of a million, will, no doubt, build a line that will prove a great convenience and benefit to the people of Baltimore and Carroll counties and at the same time return fine dividends to those who put their money into it. So says the Baltimore *American*.

The ordinance granting the South Seattle, Wash., electric railway leave to discontinue the running of its cars until May, 1895, has been passed by the Board of Aldermen. A resolution providing that in consideration of the permission granted the company shall pay to the city two per cent of the gross earnings after it resumes operation was stricken out.

A. N. Broadhead, of Jamestown, N.Y., has been elected president of the Waverly, Sayre and Athens Street Railway Company, and A. C. Wade, of that city, secretary and treasurer of the same. Mr. Broadhead and Mr. Wade were also recently elected president and secretary-treasurer, respectively, of the Susquehanna Valley Electric Traction Company.

The Skowhegan and Norridgewock Street Railway and Power Company has completed its organization by the election of W. H. Wildes, of Skowhegan, Me., as president, I. C. Libby, of Waterville, treasurer, A. R. Bixby, clerk, A. F. Gerald, of Fairfield, manager. The capital stock is $50,000, and the building of the road is let to the Worcester Construction Company of Massachusetts. Work was to be commenced this week, and the company expect to have it running early in September. A distance of nearly six miles, from Skowhegan to South Norridgewock, is to be covered.

A formidable trolley enterprise, of which Albany, N. Y., will be the northern terminus, has begun to take form. It is stated, on what appears to be excellent authority, that the electric road between Poughkeepsie and Wappinger's Falls, which is approaching completion, is only one link in a chain of trolley systems connecting all the inland towns between New York and Albany. A road connecting Wappinger's Falls with Fishkill will next be constructed. Mr. Hinckley, the president of the road, it is definitely stated, is one of the representatives of certain influential capitalists, who are putting this great scheme through.

The franchises given to the New York, Mamaroneck and White Plains Electric Railroad Company and the New York, Elmsford and White Plains Electric Railroad Company to construct, operate and maintain street surface railroads through the main thoroughfares of White Plains, were declared inoperative on Friday evening by the Board of Trustees, because the companies had failed to comply with all the conditions imposed. It is understood that a local company, headed by S. H. Gainsboro, of Silver Lake Park, will apply for the franchises. It is intimated, however, that the board will request bids for the franchises, and the proceeds, if any should be obtained, will be applied to the liquidation of the corporation indebtedness.

It is thought that the four elevated roads of Chicago, either completed or in course of construction, may amalgamate and become one gigantic loop system. Mr. D. H. Louderback, widely known in telephone circles, is at the head of one of the big roads that will use electricity, and, in speaking of the ordinance extending the Lake street "L," says:

If the Mayor signs the ordinance we shall at once proceed to let the contracts, and shall complete the work as quickly as possible. The new terminal will be used by both the Lake Street and the Northwestern roads, and will bring from 125,000 to 150,000 people into the heart of the city on Lake street daily. We expect to be working at this rate within three years. We believe this will add 50 per cent of value to every foot of property in Lake street, and convert that thoroughfare from a wholesale street back into a retail street. That has been the history of elevated roads in New York and Brooklyn, and we feel certain that the same result will come here.

The National India Rubber Company.

This company has recently issued from its home office at Bristol, R. I., a very neat and comprehensive catalogue giving information concerning its seamless rubber insulated wires and cables for all purposes. Price lists appear of the telephone wires and cables, solid and stranded conductors, electric light wire, Mac tape, etc., and a complete series of copper wire tables. This company has other offices in Providence, Boston, New York and Philadelphia, and the enterprising Metropolitan Electric Company handle their product in Chicago and the West. A test of N. I. R. insulation was recently made by the United States Government at Newport. It is as follows and is a test that the National company have every reason to feel proud over:

DOUBLE CONDUCTOR N. I. R. CABLE AFTER ONE MONTH'S IMMERSION IN SALT WATER.

The double conductor N. I. R. cable submitted by the National India Rubber Company, Bristol, R. I., has been tested and is satisfactory. The resistance of the insulation is 2,270 megohms per knot.

The cable was further tested by cutting off about 10 feet and about 300 pounds hung to it, then knots were tied in it; it was twisted up tight and kinks made in it and hauled taut. In one kink the outside braiding was torn, but it was impossible to tear it again, though it was particularly tried.

After this handling, this piece was put in a barrel of water and tested for continuity and leaks. No injury seemed to have been done to the wires or insulation. The copper wires are tough and pliable and the tinning seems to be well done.

Respectfully,

DUNCAN KENNEDY,

Lieutenant Commander, U. S. Navy.

Naval Torpedo Station, Newport, R. I., March 19, 1894.

The Bachelder Spring Indicator.

The Thompson & Bushnell Company, of 110 Liberty street, New York, of which Mr. Richard Thompson is president and Mr. John H. Bushnell is secretary and treasurer, is meeting with great success in supplying electrical companies with the Bachelder adjustable spring indicator for steam engines. This indicator is an entirely new departure, a most important feature being the flat spring. The object of the inventor was to simplify the instrument and avoid the necessity of changing springs for the different pressures. This is fully accomplished with the flat steel spring, which is adjustable to a large range of pressure.

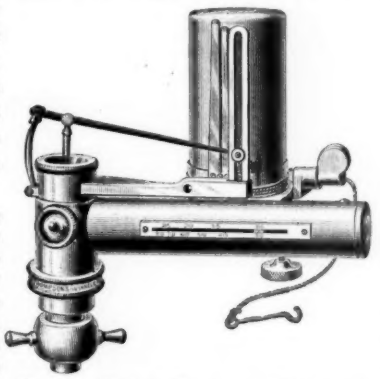


FIG. 1.—FRONT VIEW OF BACHELDER INDICATOR, WITH CAP OFF, FOR OILING PISTON.

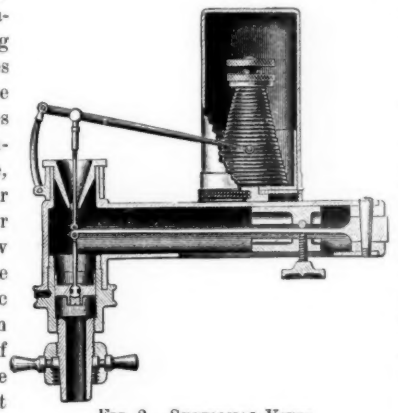


FIG. 2.—SECTIONAL VIEW.

The change from one scale to another is easily and quickly made, thus avoiding the necessity of having a series of springs, as well as the trouble and inconvenience of changing.

Among the electric light and power companies using the Bachelder indicator are the Catskill Illuminating and Power Co., Catskill, N. Y.; the Hudson Light and Power Co., Hudson, N. Y.; Schuyler Electric Co., Middletown, Conn.; Pittsfield Electric Co., Pittsfield, Mass.; Gardiner Electric Co., West Gardiner, Mass.; Newark and Orange Street Railway Co., Newark, N. J.; Neptune Electric Co., Asbury Park, N. J.; Excelsior Electric Co., Harrisburg, Pa.; People's Street Railway, Scranton, Pa.; National Transit Co., Oil City, Pa.; Cleveland Electric Light Co., Cleveland, Ohio; D. H. Dugar, chief engineer, Electric Light Co., Knoxville, Tenn.; Bloomington Electric Light Co., Bloomington, Ill.; Edison Light and Power Co., La Crosse, Wis.; Warrensburg Electric Light Co., Warrensburg, Mo.; Bay County Electric Co., Bay City, Mich.; Beatrice Electric Light Co., Beatrice, Neb.; Seattle Con. Electric Railway Co., Seattle, Wash.; Los Angeles Electric Co., Los Angeles, Cal.; Groves Brothers' Electric Light Co., Fergus, Ont., Can.

Three illustrations of the indicator are published, front view, sectional view and full size view of the spring.

The flat spring is one of the most important features of the indicator: its accuracy is beyond dispute and its durability unquestioned. These facts are easily accounted for, when we bear in mind that it is not subjected to an extreme heat, or sudden change of temperature (as is the case with the spiral springs). The up and down movements are alike—no crowding or kinking.

Three years' use of these indicators has not shown the slightest variation in any of the scales. The piston connection being made with ball and socket, there is no crowding to one side or other, thus ensuring a quick responsive action without friction.

Messrs. Thompson & Bushnell are proud of the record of this instrument and have a right to be.

FIG. 3.—VIEW OF SPRING.—FULL SIZE.

A Large Alternator.

At the works of the Fort Wayne Electric Corporation there is running and being tested a new alternating current dynamo. This dynamo is the last of a series of ironclad alternators designed by Mr. James J. Wood, the company's electrician. This alternator has the largest capacity of any single armature compound wound alternator ever constructed in this country, having one-fifth larger capacity than the big alternators exhibited at the Chicago Exhibition. The machine from the first has worked beautifully, and in every particular more than meeting the expectation of the designer; and so far as the workmanship is concerned, which is of the highest possible character, it reflects great credit upon the ability of the workmen who constructed it. The design is beautifully artistic, embodying all the beautiful lines and curves exhibited in all of Mr. Wood's apparatus, while the efficiency is considerably over 90 per cent. Judging from the operation of this alternator during the test, the company predict a great future for it, believing that no person could see it work without being favorably impressed by its operation. It is capable of operating 6,000 sixteen candle-power lights, and some idea of its size will be realized from the following dimensions:

It is 16 feet long, 8 feet wide and 10 feet high, while it weighs 31,000 pounds, producing a current of 150 amperes at 2,200 volts, requiring an engine of 600 horse-power to drive it.

TELEPHONE SERVICE IN CHICAGO.

THE "CENTRAL" END OF IT PRESENTED AT SOME LENGTH—HOW TEN THOUSAND SUBSCRIBERS ARE ANSWERED AND THEIR CALLS SATISFIED.

To the Editor of Electrical Review:

"Number?" The word is both a response and an interrogation. It is the question asked more times in the day than any other. The voice is clear and distinctly feminine, and yet the speaker is never seen. The question is heard at 10,000 different places in the city each day, an aggregate of 150,000 times. The reply received determines the point to which the next words shall be spoken, north, south, east or west, throughout the city, or north, south, east or west, throughout the country. One mile or a thousand miles are depending upon the reply to the question. "Number?" for the questioner is the telephone girl at some central office, and hers is the hand which connects the line of the calling subscriber through the maze of switchboards, trunk wires, plugs, cords, cams and cables, to the line of the number called for.

A visit to the central exchange and interviews with some of the operators develop interesting and amusing points observed only at the "central" end of a line and not appreciated by telephone subscribers generally.

In the main exchange about 120 young women are found, neatly dressed in black, seated in front of the great multiple switchboard. Each is intently watching the annunciators or drops which indicate when calls are received from subscribers whom she is to answer, and whose calls may be for connection with any one of the 5,000 main office lines before her, or over any one of the 400 trunk lines extending to branch offices.

A head telephone is held against the ear by a broad cap or band, leaving the hands free to manipulate the plugs, call keys and other appliances used in completing connections. Up and down behind the long row of girls walk the supervising operators, scanning the work of each and relieving any sudden "rushes" of calls which may occur.

Back of each division of 12 operators is the high desk of the division chief operator, to whom each operator has a line direct, and from whose desk connection may be made with the telephone of each girl in the division.

Nearly all of the operators are talking, repeating the universal question, "Number?" or giving orders to distant offices, and yet there is no noise or confusion, the transmitter being keyed up to such a pitch that a very low but distinct tone is employed. Shut your eyes and you hear only the buzzing of the annunciators and keys, which will remind you of the whirr of grasshoppers in a harvest field. Connect with an operator's circuit by telephone, however, and all the talking of "Central" may be plainly heard and every movement watched. Buzz goes an annunciator, and a call is noted on drop No. 10. At once the operator inserts a plug into the spring-jack connecting with line No. 10, presses her key, and says "Number?" A man's voice replies, "Main 4,964." Tap, tap, goes a second plug at the "jack" of line 4,964, buzz goes the generator key ringing the bell at 4,964, and the connection is completed, the whole operation taking less than ten seconds. In less than a minute down goes drop 10 again, in goes the key, and the operator asks, "Did your party answer?" "Yes," replies the same voice. "Now give me Oakland 49." Tap, tap, tap, tap, goes the second plug again, the four sharp clicks indicating that four Oakland trunks are tested before one is found not busy, and in goes the plug on No. 5 trunk. Then the Oakland call key is pressed, and the operator says, "Five, forty-nine," indicating to the operator at Oakland, four miles away, that on trunk No. five line number forty-nine is wanted. Tap, goes the trunk plug, buzz, again goes the generator, and the second call is completed. Meanwhile No. 27 has called for Main 462. At the tap of the plug at No. 462 a sharp click is heard, showing that the line 462 is busy at some other part of the switchboard. "Four-sixty-two busy now, please call again," says the operator, and a subdued growl is heard from No. 27. The signal to the operator, however, has indicated positively that the line was busy elsewhere, and, as the call is repeated three times in as many minutes before the line is found disengaged, it is evident that it is far easier to complete a connection at once than to say "line busy" when such is not the case. Now drop 49 is down, and the following is heard:

Operator. "Number?"

No. 49. "Hello there!"

Operator. "What number, please?"

No. 49. "Hello, is that Central office?"

Operator. "This is Central. What number?"

No. 49. "Say, Central, has Jones Bros. got a telephone?"

By this time another call is waiting, and the operator saying "wait a minute," connects No. 49 to the division chief operator, who, after informing the party calling that there are four firms of Jones Bros. having telephones, finds out just what is wanted, gives him the proper number (which, had he looked, he would have found in his telephone directory), and complete the connection. Meanwhile, six other calls, in which the calling parties knew just what they wanted and asked for it, have been completed. Next a long continued buzzing is heard on drop 17. The operator plugs in four times, but cannot talk, as the subscriber continues to ring his bell. Finally the ringing cases, and a man evidently out of breath and red in the face at No. 17 says, "There! I thought I'd get you if I rang long enough! Look here, Central, I want 516 South, and I want it quick, too!" Presto, and the connection is made to South office, but soon a jerky buzz in the "clearing out" drop indicates that there is more trouble. The operator cuts in with the usual remark, "Did your party answer?" and again 17 breaks out "Great Scott, Central! What are you doing up there? I'll report you. I called for the Arctic Ice Company and you gave me the Lucifer Turkish Bath!" "Central," finding that the connection to 516 South was properly made, mildly suggests to No. 17 that he called for the wrong number. No. 17 hangs up his telephone and rings off viciously, but a moment later calls in a meek voice for 516 *North*, an actual difference of five miles from the first call, and all the difference between right and wrong to the operator. So the calls come, now one at a time, and now two, at which time the calling party who waits more than 30 seconds for his answer shows by his tone of voice that he feels neglected. When more than two calls come at about the same time, one or more are answered by adjacent operators, and nowhere can a delay of a minute be noticed. One call comes from a lady, who says she understands that some one called her on the telephone about an hour ago, and wants to know who it was. Some one of 10,000 subscribers, but which? "Central" cannot possibly tell, and a doubtful tone is heard in reply, "Well, *perhaps* you can't, but it seems very funny."

Now a loud noise is heard in the office for the first time, a sharp gong bell strikes, and the morning recess has come. About 30 operators are relieved by others who take their places and the work goes on.

Calls come in for numbers in every office, for every class of business in locations ranging from Bridgeport to Boston. No. 600 wants "Long Distance." By means of a calling key, a switching operator is told to connect line 600 to Long Distance office. There a toll operator takes the call and completes the connection to a broker's office on Wall street, New York, in less than one minute, and the conversation is carried on over the thousand miles of metallic circuit as easily as if the distance were but one mile. Calls to Washington, Boston, Buffalo. Cleveland and all the cities in the Eastern and Middle States go through in the same manner, and as readily as to Chicago suburbs. Through it all the guiding hand is that of the girl in the "Central," who, when calls are properly made, completes connections with marvelous rapidity. Delays and errors, indeed, are caused usually by subscribers who are uncertain as to what they want, who try to talk to the operator or violate in some other way the simple and brief rules for using the telephone properly. The worst of this class is found to be the deadly office boy or the smart clerk, who do more to injure telephone service than all other users combined.

About 450 young women are employed in the 10 central offices comprising the Chicago exchange, filling the positions of chief operators, assistants, division chiefs, relief, supervising, trunk line and subscribers' operators. Some have been in the service for 10 years, many for more than five, and it is seldom that a competent operator desires to resign her position.

The 10,000 telephones in the exchange are scattered throughout the length and breadth of the city. In some of the great office buildings 100 or more instruments are in operation, while scattered lines may be found reaching the remotest districts. The 10,000 telephones, transmitters, batteries, call bells and other appliances at the stations of the subscribers represent, in a small degree, only the actual plant necessary to the service of the exchange. To provide for the lines there are 48 miles of subway with 800 manholes, 22,000 miles of wire in cables, and 8,000 miles of wire on poles in outlying districts, a plant outside of the offices requiring the services of nearly 500 men for its proper maintenance and inspection.

But the telephones and the lines combined do not furnish the service of the exchange. The service to-day is a means whereby from the 10,000 subscribers 150,000 calls may be received each day, and connections so made that 300,000 people may talk together by means of the telephone. A system of 900 trunk wires with call circuits and signals of various kinds is employed in providing for about 60,000 connections which are "trunked" daily from one exchange to another. Switchboards are provided at each exchange through which all the lines and trunk wires of that exchange are so connected that the operators may readily reach any desired line in the entire system. In the main office 5,400 lines extend through a great multiple board, in which are located 172,800 line springjacks, 7,200 trunk springjacks, 5,400 annunciator drops, 2,400 plugs and cords, 1,200 cord keys, 1,000 call wire keys, besides visual and lamp signals, relays, storage batteries, dynamos and many other intricate detail parts which go to make up modern telephone switching appliances. When one realizes that to each spring-jack four wire terminals are soldered, making 720,000 such terminals in the main office alone, the magnitude of the detail switchboard work will be appreciated.

Such then is the system of machinery into which are gathered the thousands of wires and countless combinations enabling the operator with trained intelligence and deft fingers to make and unmake electrical connections so that 300,000 people may daily talk together by telephone. Such is the actual work of the girl at "central," aided by the co-operation of the intelligent subscriber, retarded and vexed by the lack of it, calling early with her "morning test, please ring off," and, later, promptly greeting your calls by her ever ready answer and question in the one word, the *multum in parvo*, "Number?"

M. M.

Chicago, July 30, 1894.

A Reduction That Didn't Reduce.

The telephone rates between Atchison and Kansas City have been advanced from 25 to 50 cents. It is claimed that the company could not pay expenses with the old rates. By the way, what has become of the proposed reduction of telephone rates?—*Atchison Globe.*

OUR BOSTON LETTER.

The United Electric Company held its annual meeting in Springfield last week and elected a new board of officers. Mr. Morgan, one of the directors, stated that the new plant at Indian Orchard would be in operation this month.

At a meeting of the Board of Aldermen of Marlboro on July 31, the location of the proposed electric road between that city and Hudson was decided upon and the franchise granted. The Marlboro people are to have the preference in the construction of the road.

The Norfolk Suburban Street Railway Company has awarded a contract for the construction of four and one-half miles of road between Readville station and Forest Hills to the Worcester Construction Company. Work will be started immediately and will cost about $100,000.

The new $65,000 power house of the Fitchburg and Leominster Street Railway Company is now in operation. The station is a substantial structure, 69x44 feet and two and a half stories in height. The most modern appliances have been used in its equipment, and its present facilities are capable of furnishing nearly 700 horse-power. The company has had a most successful career, starting eight years ago with a capital of $60,000 and three and one-quarter miles of track, and increasing from that time to a capital of $250,000 and 13½ miles of track.

The Eastern Electric Cable Company, of this city, far from being affected by the general depression in business circles, have been running continuously at full time, and within the past week have been obliged to resort to night work to keep abreast of their orders. This does not arise from an effort to fill any large special order, but from the demands of steady customers whose orders may be depended upon. So heavy has been the tax on their facilities, that the company has been obliged to refuse several large special orders recently, which could not be filled without delay to their regular trade.

The Hancock Equipment Company, of 41 Federal street, Boston, is the title of a new concern in the electrical field, who will make a specialty of mechanical and electrical engineering. The members of the firm are: Frank B. Witherbee, Chas. A. Cotton and Alfred S. Kellogg. Mr. Witherbee and Mr. Kellogg have for the past two years been prominently connected with the Davidson Ventilating Fan Company of this city, and have a large acquaintance among electrical men. All three members of the firm are young, enterprising and ambitious, and being thoroughly grounded in the practical knowledge of their business, are pretty sure of making it a success. Aside from their engineering work, of which they have already secured considerable, they have been appointed New England agents for the Woodbury automatic high-speed engines, and boilers manufactured by the Stearns Manufacturing Company, of Erie, Pa.

The Campbell Electrical Supply Company, of this city, have received a letter from the firm of Freese Brothers, electrical contractors, of 28 South Fortieth street, Philadelphia, under date of July 3, which, as a recommendation of their "Century" wire, is worthy of publication, and I give it verbatim:

"THE CAMPBELL ELECTRICAL SUPPLY
"COMPANY:

"GENTLEMEN—We have wired the Philadelphia abattoir throughout with your Century F. and W. P. wire, and about 10 days after we had finished the place was flooded. The most of your wire was in the cellar where they salted hides, and the wire was under three feet of salted water for 80 hours. After the water had gone out, we had our men to wipe out the mica sockets and then to turn on the current. Everything went off first class, the water did not penetrate the insulation, for we found the wire perfectly dry. We think it was as severe a test as anybody should wish for, and we are very much pleased with your wire. I will be in to see you in regards to another large order.

"Yours truly,
"Signed, FREESE BROTHERS."

Voluntary testimonials of this nature are extremely gratifying to a manufacturer who is honestly endeavoring to bring his goods to the highest state of perfection, and appreciation openly expressed is one of the strongest incentives to that end.

Boston, August 4. H. G. T.

ELECTRIC LIGHT FLASHES.

J. H. Vernon has organized the Keyser, W. Va. Electric Light Company.

The new brick building of the General Electric Company, at Scheuectady, N. Y., will be 219x78 feet.

Westinghouse Electric Company is now employing more than 2,000 hands at Pittsburgh and about 700 in Newark and is turning out its full capacity.

The City Council of Champaign, Ill., has voted to give a seven year contract to the Electric Lighting and Power Company of that city. Lamps are to be $95 a year.

Since the city lighting was taken from the Citizens' company, of Brooklyn, its stock has fallen from 160 to 102. This company should wake up, change its methods and go in for commercial lighting.

The State Electric Light and Power Company, of Brooklyn, N. Y., has voted to increase its capital from $200,000 to $500,000. This company recently received a franchise, but as yet has no station or lines up.

The village trustees have made a contract with the Middlebury, Vt., Electric Company for lighting the streets of the village for one year from the 23d instant. The company will furnish 25 arc lights every night when needed for $60 each.

The plant of the Narragansett Electric Lighting Company, of Providence, R. I., is being greatly enlarged and improved. President Marsden J. Perry and General Manager John J. Moore expect to have the largest station in the world when all improvements are completed.

At Newark, O., last week the City Council took action on the municipal electric light plant. The steam plant was accepted and ordered paid for and one installment on the light plant ordered paid. In the meantime the company will be asked to repair one of the dynamos disabled during the trial run.

Electric light companies probably feel the effect of hard times as much as any branch of business, as one of the first economies of people in hard times is in light. As an illustration, the receipts of the Edison company, of Brooklyn, one of the strongest of the Edison companies, have fallen off between $3,000 and $5,000 per month, mainly through economy in light.

President M. J. Francisco, of the National Electric Light Association, in the New York *Evening Post*, corrects several misstatements made by Professor Ely, of the Wisconsin State University, in regard to the cost of electric lighting in Rutland, Vt. Professor Ely should be sure of his facts before "knowing so much that ain't so."

The amount of work at the General Electric factories in Lynn, Mass., continues to be about the same in all departments, and no further reduction has been made in the force of employés for the past several weeks; indeed, quite a number, it is stated, have been added to the pay rolls. While all the departments are running full time and turning out a great deal of work, both the meter and railway departments are rushed with orders. The former department has been busy during the entire dull times. It is claimed that the reason for this is that meters have been purchased by users of the electric light so as to curtail their bills.

Will Resume Manufacturing at Once.

TO THE EDITOR OF ELECTRICAL REVIEW:

We have just received the following telegram, which is self-explanatory:

CHICAGO, ILL., August 2, 1894.

CHAS. D. SHAIN,
136 Liberty St., New York:
Factory burned. Will resume manufacturing immediately, and deliver within 90 days. Patterns and plan saved.
(Signed) SIEMENS & HALSKE ELEC. CO.

From the above please note that we are still in the ring.

Yours, etc.,
CHAS. D. SHAIN,
Genl. Eastern Agt.

New York, Aug. 2, 1894.

40's, 52's and 60's.

We have for immediate delivery in Eastern Iowa the following T Rails:

About 90 tons of 60 lb. steel; 80 tons of 52 lb. steel; 70 tons of 52 lb. iron and 30 tons of 40 lb. iron rails.

All these are in good condition to relay.
If you want rails, either new or second-hand, write or wire to us at our expense.

ROBINSON & ORR,
No. 419 Wood St., PITTSBURGH, PA.

ABSOLUTELY

FIRE-PROOF.

MAGNESIA

SECTIONAL STEAM PIPE AND BOILER COVERINGS.

SELLING AGENTS:
Robert A. Keasbey, New York, 54 Warren St.
S. C. Nightingale & Childs, Boston, 134 Pearl St.
Macan & Co., Philadelphia, 1420 Callowhill St.
Wallace & Bro., Baltimore, 432 E. Pratt St.
Wm. B. Morgan, Washington, Builders' Exchange.
Delbert Engineering Co., New Orleans, 23 Union Street.
Symmes & Co., Memphis, 196 Front St.

THE GREAT COAL SAVER.

MANUFACTURED BY
THE KEASBEY & MATTISON CO.,
CINCINNATI: 114 West Second St. AMBLER, PA. CLEVELAND: 117 Water St.

SELLING AGENTS:
F. Sprinkman, Milwaukee, 133 Sycamore St.
W. W. Hite & Co., Louisville, 176 Fourth St.
F. Bocler, St. Louis, 108 Walnut St.
S. P. Conkling, Detroit, 20 Atwater St., East.
C. W. Badgley & Co., Denver, 18th & Market Sts.
Utah & Montana Machinery Co., Salt Lake City.
R. W. James, Butte City, Mont.
DeSolla & Deussing, San Francisco, 2 California St.

KINDRED INTERESTS

The Perkins Electric Switch Manufacturing Company, of Hartford, is to increase the size of its factory by about 15,000 square feet of floor space. The improved and enlarged plant will be ready October 1.

Mr. A. O. Schoonmaker, who makes a specialty of India mica, claiming it to be the best in the market for insulating work, finding that there is a demand for Canada amber mica has now put in a full line of that grade, and is prepared to fill orders for it, cut, uncut or stamped for segments at lowest prices.

Regu-Atwater, 214 Pine street, San Francisco, have taken agency for Pacific Coast for A. O. Schoonmaker, the well-known importer of India mica. They carry a full line in stock, cut, uncut or stamped for segments, and can fill orders promptly and at lowest prices.

The Eastern Electric Cable Company, of Boston, is very busy turning out the popular Clark wire. The company is not only running a full force of hands all day, but is compelled to work three evenings every week to keep up with wire orders. Messrs. Clark and Eustis have won deserved success in the management of the Eastern company.

Mr. Ross C. King, representing the New York Belting and Packing Company, Limited, 15 Park Row, New York, is sending a rather unique card of advance notice to his trade. It reads as follows: "Are you on the grind? I'll be on the ground—with the Vulcanite Emery Wheel, Fast and Safe." This little skit is attracting considerable attention among consumers of emery wheels.

The Billings & Spencer Company, of Hartford, have just completed arrangements with the Pettingell-Andrews Company, 72-74 Federal street, Boston, Mass., whereby they become sole agents for Billings' patent drop forged commutator bars for the United States and Dominion of Canada. Mr. Frank X. Cicott, manager of the railway department for the Pettingell-Andrews Company, has charge of this matter.

These are days when the business ill-health of many a concern is prevalent. There are many firms (like individuals) that are not feeling just right, and they don't know just what is wrong until they call in their physician. The expert accountant is to business what the physician is to individuals. Should any concern be suffering in this respect they would do well to summon W. W. Dixon, accountant and auditor, Temple Court, New York city.

The Harrisburg Foundry and Machine Works, Harrisburg, Pa., has entered orders within the last few days for some 15 of the celebrated Harrisburg Ideal engines, several of which are direct connected. These engines are distributed on orders from Kentucky, Pennsylvania, New York and other States. The increased demand for these popular engines has compelled the firm to increase its force and run extra time in order to meet the demands of delivery.

The Brush Electric Company, of Cleveland, Ohio, has kindly forwarded to us copies of three very handsome catalogues relating to the excellent apparatus of this company. Their constant potential arc lamp for incandescent circuits has recently been put on the market. They are placing on the market 80 and 100 light dynamos, in addition to the 125 lighter, which they have been manufacturing for some little time. The 125 lighters are taking well, and quite a number have been shipped. They are also doing very nicely with the 100 lighters.

The National Pipe Bending Company, of New Haven, Conn., manufacturers of the National feed water heater, reports sales of heaters during the Summer months as follows: 300 horse-power, Fox River Street Railway Company, Green Bay, Wis.; 600 horse-power to Dominion Coal Company, Nova Scotia; 300 horse-power to New York city; 100 horse-power to Philadelphia, Pa.; 1,000 horse-power, Springfield Street Railway Company, Springfield, Mass.; 300 horse-power to Ithaca Street Railway Company, Ithaca, N. Y.; 600 horse-power, Greenwich Gas and Electric Light Company, Greenwich, Conn.; 400 horse-power Steinway Railway Company, Astoria, L. I.; 200 horse-power, New York city; 300 horse-power, Middletown, N. Y.; 300 horse-power, Hamilton, Ohio; 100 horse-power, Bloomsburg, Pa.; 250 horse-power, Merchants' Freezing and Cold Storage Company, Providence, R. I.; 400 horse-power, Piedmont Pulp and Paper Company, Piedmont, W. Va.; 800 horse-power, Somerville Electric Light Company, West Somerville, Mass.; 300 horse-power, Statesville, N. C.; 500 horse-power, Atchison Railway and Electric Company, Atchison, Kas.; 500 horse-power, Electric Company of Virginia, Norfolk, Va.; 100 horse-power, Valatie, N. Y.; 100 horse power to East Liverpool, Ohio; 200 horse-power, Hotel Vendome, New York; 400 horse-power to Morris County Electric Light Company, Morristown, N. J.; 250 horse-power, Morse Twist Drill Company, New Bedford, Mass.; 250 horse-power, New York city; 300 horse-power, Pittsburgh, Neville Island and Coraopolis Railway Company, Coraopolis, Pa.; 500 horse-power, Boston Electric Light Company, Boston, Mass.; 300 horse-power, Newark, N. J.; 800 horse-power American Electrical Works, Providence, R. I.; 500 horse-power, Electric Railroad Company, Wakefield Center, Mass.; 300 horse-power, Watch Hill Electric Railroad Company, Westerly, R. I.; 600 horse-power, Fitchburg and Leominster Street Railroad Company, Fitchburg, Mass.; 300 horse-power, South Jersey Traction Company, Point Pleasant, N. J.; 400 horse-power, People's Edison Illuminating and Power Company, River Point, R. I.; 200 horse-power, New Haven City School District, New Haven, Conn.; and 400 horse-power to Paris Oil and Cotton Company, Paris, Texas. This is splendid business for the dull months.

MY WIFE CANNOT SEE HOW YOU DO IT AND PAY FREIGHT.
$14 Buys our 2 drawer walnut or oak Improved High Arm Singer sewing machine finely finished, nickel plated, adapted to light and heavy work; guaranteed for 10 Years; with Automatic Bobbin Winder, Self-Threading Cylinder Shuttle, Self-Setting Needle and a complete set of Steel Attachments; shipped any where on 20 Day's Trial. No money required in advance 75,000 now in use. World's Fair Medal awarded machine and attachments. Buy from factory and save dealer's and agent's profits. FREE Cut This Out and send to-day for machine or large free catalogue, testimonials and Glimpses of the World's Fair.
OXFORD MFG. CO. 342 Wabash Ave. CHICAGO, ILL.

WHITE-CROSBY CO.,
CONTRACTING ENGINEERS,
Equitable Building, Baltimore, Md.
New York Office, 29 Broadway.
Chicago Office, The Rookery.

ELECTRICITY

DIPLOMAS AWARDED. Courses in other trades, all including thorough instruction in Mathematics and Physics. Send for FREE Circular stating subject you wish to study. to The Correspondence School of Industrial Sciences, Scranton, Pa.

BAKER & CO.,
Importers, Melters and Refiners of
PLATINUM,
408, 410, 412 and 414 N. J. R. R. Ave., NEWARK, N. J.
Platinum in sheet and wire, all sizes, and any degree of hardness. Scrap and native platinum purchased.
NEW YORK OFFICE: 121 LIBERTY STREET.

New York and New England Railroad.
ELECTRICIANS AND OTHERS IN TRAVELING BETWEEN
BOSTON AND NEW YORK
SHOULD ALWAYS USE
THE "AIR LINE LIMITED"
Leaving Either City 3 P. M., Due at the Other 9 P. M., EVERY DAY IN THE YEAR.
Buffet Smokers, Parlor Cars and Coaches. Dining Car between Boston and Willimantic.
TICKET OFFICES:
IN BOSTON: 322 WASHINGTON STREET. STATION, FOOT SUMMER STREET.
IN NEW YORK: 353 BROADWAY. GRAND CENTRAL STATION.
GEO. F. RANDOLPH, Gen'l Traffic Manager.
W. R. BABCOCK, Gen'l Passenger Agent.

BEST FOR ALL
Electrical Work
PATENT PERFORATED ELECTRIC LEATHER BELTING
CHARLES A. SCHIEREN & CO.,
Patentees and Sole Manufacturers.
47 Ferry Street, New York.
226 No. Third Street, Phila.
46 So. Canal Street, Chicago
119 High Street, Boston.

THE GENERAL ELECTRIC LAUNCH CO.
44 BROAD STREET, NEW YORK.
ELECTRIC LAUNCHES BUILT COMPLETE, $750. UPWARDS.
ELECTRIC EQUIPMENTS FOR ROW BOATS, $320. UPWARDS.

THE
Health and Pleasure Resorts
OF
MICHIGAN AND THE WEST
are illustrated and described in a handsome folder which has just been issued by the Michigan Central, "The NIAGARA FALLS ROUTE." This folder is designed for the special use of people in the East who wish to learn something about the resorts of Michigan (including Mackinac Island and the Lake Superior Region), Wisconsin, Minnesota, Yellowstone Park, Colorado, Utah and the Pacific Coast, and will be sent on application to
W. H. UNDERWOOD, Eastern Passenger Agent,
BUFFALO, N. Y.